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, MPH
S2-573
Charged particles in the Earth's magnetosphere: Recent results from the ECT instrument suite onboard the Van Allen Probes mission
[0], [1], [2], [2], [3], [4]
[1]NASA Goddard Space Flight Center, [2]LASP, University of Colorado, [3]The Aerospace Corporation, [4]Los Alamos National Laboratory , [5]Univeristy of New Hampshire
The Van Allen Probes mission comprises of two identically instrumented spacecraft, are probing the Earth' inner magnetosphere with unprecedented detail. The two spacecraft were launched late August 2012 and carry a comprehensive suite of instruments that characterize electric and magnetic fields, plasma waves and charged particles in the Van Allen belts. In particular the ECT suite of instruments comprising of HOPE, MagEIS and REPT instruments measure electrons,protons and ions and their angular distributions over energies ranging from a few eV to several tens of MeV.The ECT measurements have already made significant and paradigm shifting contributions towards the understanding of the physics of charged particles in the Earth's radiation belts. We present here a review of the science results, describe the ECT instrument suite and the details of data access to the science community at large.

, MPH
S4-575
Understanding the anisotropy of cosmic rays in the TeV-PeV energy range
[1]
[1]University of Potsdam
The anisotropy in the distribution of cosmic-ray arrival directions measured in the TeV-PeV energy range by several experiments shows both large and small- scale structures. While the large-scale anisotropy can be explained within the framework of a diffusive propagation of cosmic rays, the origin of the small-scale structures remains unclear. We investigate the arrival directions of charged particles using numerical three-dimensional Monte-Carlo test-particle simulations, in which the test-particles propagate in a time-independent spa- tially fluctuating magnetic field derived from a three-dimensional isotropic turbulence power spectrum. It has been recently argued that the turbulent magnetic field itself generates the small-scale structures of the anisotropy if a global cosmic-ray dipole moment is present. Using our test-particle approach, we can test the reliability of that hypothesis.

, MPH
S6-572
The Astrophysics of Cosmic Ray Anisotropy: a Review
[1]
[1]University of Wisconsin - Madison
This is a review of the observations of cosmic ray anisotropy in a wide energy range, spanning from sub-TeV to EeV energy range. The observations will be described, addressing the different experimental techniques used at the various energy ranges, and stressing the potential physical mechanism they are able to probe. Proposed scenarios that address the origin of the cosmic ray anisotropy will be reviewed as well. The interpretations of experimental results will have to rely on a multi-displininary approach in order to disentangle different physics processes that simultaneously affect the transport of cosmic rays in magnetized plasmas. Using cosmic rays to probe the properties of magnetic fields at different scales and to pinpoint to the origin of cosmic rays are among the main drivers.

, MPH
S6-574
tatus of High-Energy Neutrino Astronomy
[1,2]

[1]Humboldt-Universitt zu Berlin , [2]DESY
With the recent detection of high energy neutrinos of extra-terrestrial origin with IceCube, neutrino-astronomy is entering a new era. I will review the latest evidence for a flux of extra-terrestrial neutrinos, along with potential astrophysical sources that can explain the observations. Furthermore, I will provide an overview of other science being addressed by current neutrino telescopes, ranging from neutrino masses to dark matter detection. Finally, I will give an outlook on a new generation of neutrino telescopes, that are currently being proposed.

Friday, 5. Sep.
10:10-10:50, MPH
S4-543
Observation of UHECRs in the next decade.
[1]

[1]ICRR Univ. Tokyo
The current status and the near future task of UHECR observation will be summarized based on the measurements by the Pierre Auger Observatory and the Telescope Array experiment. The upgrade plans of existing experiments and newly proposed experiments in the next decade, on the ground and in the space, will be reviewed and the prospects will be discussed.

Friday, 5. Sep.
09:00-09:49, MPH
S5-505
Beyond the Galaxy: UHECR results from the Pierre Auger Observatory and the Telescope Array
[1]

[1]Instituto Gallego de Fisica de Altas Energias, Departamento de Fisica de Particulas, Universidad de
The beginning of the XXI century has brought much progress into the field of Ultra High Energy Cosmic Rays particularly through the the completion of the Pierre Auger Observatory first and the Telescope Array later on. The success of these detectors follows from their hybrid character combining the advantages of the fluorescence technique for energy determination with the larger exposure provided by an array of particle detectors. In this article we review the important contributions made by both experiments concerning the spectrum, anisotropy searches and composition studies including bounds on photons and neutrinos. We discuss how these measurements have contributed to the progress in the field partially solving long standing puzzles and how they have also lead to new challenges that are likely to constitute the driving force of the field for the immediate future.

Friday, 5. Sep.
09:40-10:10, MPH
S5-532
LHC data and forward physics at high energies
[1], [1]

[1]Karlsruhe Institute of Technology
The relation of the phase space accessible to measuremnts at the LHC experiments for the development of extensive air showers is discussed. This is important in order to understand the impact of model re-tuning on cosmic ray data analyses. And furthermore, it is shown how additional dedicated measurments in the future can further improve the relevant predictions of hadronic models in extensive air showers. It is also shown how cosmic ray data anlyses can contribute to a better understanding of hadronic interactions at energies not accessible to accelerators.

Monday, 1. Sep.
11:15-12:00, MPH
S1-534
Extreme Solar Events in an Historical Perspective
[1,2]

[1]SSL, UC Berkeley, [2]U. of Glasgow
The past few years have seen striking developments in the development of proxy information regarding extreme solar events, which I summarize here. These include the controversial signature of nitrate layers in the polar icecaps, the discovery of clear radioisotope signatures on the basis of annual averages in tree rings, and the availability of systematic stellar photometry from the Kepler satellite. I will put these into the solar context, which has gradually been growing more complete as the space age ages and data become more accurate.

Monday, 1. Sep.
12:20-12:40, MPH
S1-562
Particles in the magnetosphere
[1]

[1]

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Monday, 1. Sep.
12:00-12:20, MPH
S2-194
Climate-related effects of cosmic rays
[1]

[1]PMOD/WRC and IAC ETHZ
The Earth is under permanent influence of the cosmic rays which are able to ionize the atmosphere. The ionization of the neutral atmosphere by energetic particles leads to the production of chemically active radicals which can destroy/produce ozone in the stratosphere/troposphere. The ionization also affect aerosol formation and global electrical circuit influencing the cloud properties. All these processes have further implications for the atmospheric dynamics and surface climate. The magnitude of the cosmic rays effects is modulated by the solar magnetic activity. In this review talk I will discuss all involved mechanisms and their representation in the state-of-art climate models. Different features of the simulated atmospheric response to cosmic rays variability will be presented and discussed. The influence of cosmic rays on the atmospheric chemistry and climate will be considered in a long term perspective for the periods when the solar activity substantially differs from the recent decades.

Monday, 1. Sep.
12:40-13:00, MPH
S2-398
Health Issues and Space Weather
[1]

[1]Belgian Institute for Space Aeronomy, Brussels, Belgium
Many of the physical and physiological demands of human adaptation to spaceflight have been well studied. Space biology encompasses such topics as how zero gravity affects the human body as well as how gravity affects the reproduction, development, growth, and aging of animals and plants. However, most analysts agree that charged particle radiation is one of the main issues in regard to sending humans on long-term interplanetary missions. For more than 30 years the field of space radiation biology and related topics have progressed based on research conducted onboard space stations (e.g., Mir, and ISS) and spacecraft, as well as

on ground-based observations and experimental studies simulating conditions in space. The implications of these space weather induced health effects (short-term and long-term) in the context of interplanetary travel will be discussed with an emphasis on energetic particle populations, their possible effects on humans, as well as current and envisioned mitigation techniques.

Monday, 1. Sep.
16:00-16:30, MPH
S3-160
Searches for ultralight Dark Matter – axions and the like
[1]

[1]DESY, Notkestr. 85, 22607 Hamburg, Germany
The axion, which is predicted within a possible solution of the strong CP problem, is long known as a fine cold Dark Matter candidate. Searching for the axion is possible directly in laboratory setups, notably through their tiny coupling to photons, as well as through astrophysical and cosmological observations. More generally, very light particles with very weak couplings such as axion-like particles and hidden photons have been identified as cold Dark Matter candidates. In this talk I will briefly review the theory and motivation of this class of particles and give a rough overview of the current and planned experimental searches for them.

Monday, 1. Sep.
15:35-16:00, MPH
S3-298
DM searches with gamma rays from ground ground and space
[1]

[1]DESY
A wealth of observations accumulated over the past years have revealed the existence of cold dark matter in the Universe. The nature of dark matter is unknown. Several theories of physics beyond the particle physic standard model exist, many predict high-energy gamma rays as result of annihilation or the decay of the dark matter particles. I review in this talk the status and future of dark matter searches with gamma rays using space and ground based instruments.

Monday, 1. Sep.
14:30-15:05, MPH
S3-528
WIMP Dark Matter - overview

[1]The Oskar Klein Centre, Stockholm University
An overview of the various models for Weakly Interacting Particles (WIMPs) is given, as well as a review of current, rapidly improving experimental limits. Some (weak) indications of claimed detection will also be discussed, and expectations for future experiments given.

Monday, 1. Sep.
15:05-15:35, MPH
S3-565
DM search with CR satellite
[1]
[1]

Monday, 1. Sep.
17:50-18:15, MPH
S4-288
The knee and beyond: a theorists view
[1]

[1]IZMIRAN, Troitsk, Moscow 142190, Russia
The origin of high energy cosmic rays is discussed. The consideration includes the model of cosmic ray origin in supernova remnants, possible contribution of other galactic sources, the structure of knee in cosmic ray spectrum at 3×10^{15} eV and its interpretation, the energy limit of Galactic sources and possible scenarios of transition to extragalactic component.

Monday, 1. Sep.
17:00-17:25, MPH
S4-350
AMS and Pamela: spectra and composition of cosmic rays below the knee
[1]

[1]Istituto Nazionale di Fisica Nucleare, Sezione di Trieste - 34149 Trieste, Italy
The origin and properties of the cosmic radiation are one of the most intriguing question in modern astrophysics. The precise measurement of the energy spectra and composition of the cosmic rays provides fundamental insight into these subjects. Several experiments, equipped with state-of-the art detectors, have recently presented new results on the composition and energy spectrum of the charged cosmic radiation with a significant improvement in statistics and systematics respect to existing data. Two satellite-borne experiments, AMS and PAMELA, are in the forefront of this exploration. We will review these experiments and discuss their most recent scientific results.

Monday, 1. Sep.
17:25-17:50, MPH
S4-524
The Knee and beyond: Results from KASCADE-Grande, IceTop and Tunka
[1]

[1]Universita‘ agli Studi di Torino
The experiments studying cosmic rays in the energy range around and above the knee of the spectrum have recently obtained important new results.

In this talk I will review the KASCADE-Grande, ICE-Top and TUNKA-133 results on the all particle energy spectrum, discussing the dependence on the hadronic interaction models used in the EAS simulation and the spectral features detected by these experiments.

Measuring the spectra of the light and heavy primaries spectral feaetures of both spectra, at different energies (from $\sim 7x10^{14}$ to 10^{17} eV), have been observed. I will show and discuss the more recent data.

These results on the primary spectrum, together with the large scale anisotropies searches, will be discussed, showing their consequcences on the knee origin hypothesis and on the transition from galactic to extra-galactic cosmic rays.

Monday, 1. Sep.
18:15-18:40, MPH
S5-535
The transition from galactic to extragalactic cosmic-rays
[1]

[1]APC CNRS/Paris 7
In this talk I will review the current observational constraints on the transition from galactic to extragalactic cosmic-rays. I will

briefly discuss cosmic-ray data from the knee to the high energy and focus in particular on the evolution of the cosmic-ray composition. I will then describe and discuss theoretical/phenomenological models proposed for the transition from GCR to EGCR.

Thursday, 4. Sep.
09:00-09:45, MPH
S1-266
Solar energetic particles from the corona into the heliosphere
[1]

[1]Department of Physics and Astronomy, University of Turku
I will review recent results on the acceleration and transport of solar energetic particles (SEPs) from the solar corona into the heliosphere, concentrating on the large SEP events characterized by proton flux increases extending to the deca-MeV range and beyond. These events have recently been analyzed and cataloged by several parallel studies, allowing one to obtain a holistic view on the timing of different particle release episodes with respect to the electromagnetic emissions related to the solar eruption. I will review the results on ions and electrons related to these events, comparing analyses from different angular and radial distances and energies. Implications of these results on the state-of-the-art models of SEP acceleration and transport will be summarized.

Thursday, 4. Sep.
10:25-10:45, MPH
S1-331
Voyager Results from the Heliopause and Their Implications for Cosmic Ray Transport
[1]

[1]Ruhr-Universität Bochum
In recent years, spacecraft like the Voyagers and IBEX have tremendously increased our knowledge about the structure of the outer heliosphere and the interstellar medium beyond. Particularly the in situ measurements by the Voyager 1 spacecraft in the inner and outer heliosheath have led to a critical revision of long-standing paradigms and are triggering a new understanding of the outer boundary region of the heliosphere. The propagation of cosmic rays in this heliospheric regime and its significance for our understanding of fundamental transport processes are reviewed.

Thursday, 4. Sep.
09:45-10:05, MPH
S1-384
The longitudinal distribution of solar energetic particles
[1], [2], [2], [2], [3], [4], [5], [1]
[1]SRG, University of Alcalá, 28871 Alcalá de Henares, Spain, [2]Christian-Albrechts-Universität zu Kiel, Kiel, Germany, [3]The Johns Hopkins University, Applied Physics Laboratory, Laurel, MD 20723 , [4]Departament dAstronomia i Meteorologia. Institut de Ciencies del Cosmos. Universitat de Barcelona, , [5]IAASARS, National Observatory of Athens, Athens, Greece
The STEREO mission consists of two nearly-identical spacecraft orbiting the Sun at 1 AU in the ecliptic plane and moving away from Earth in opposite directions at a rate of 22.5 degrees per year. They are observing the Sun uninterruptedly since October 2006, providing a comprehensive set of remote-sensing and in-situ observations. The combination of STEREO and near-Earth observations provides three-point observations of solar phenomena from points increasingly separated in longitude and with very similar heliocentric distances. This configuration is ideal for studying Solar Energetic Particle (SEP) events from locations widely separated in longitude, and in particular for determining how the SEP properties (such as peak intensities, anisotropies and onset-time delays) vary as a function of the angular separation between the observers magnetic footpoint and the source active region at the Sun. In this work we review the main findings achieved by STEREO in this subject during solar cycle 24. We also present case-studies showing exceptionally broad particle spread around the Sun, such as the SEP events observed on 17 January 2010 and 3 November 2011, and discuss the physical scenarios proposed to explain these observations.

Thursday, 4. Sep.
10:05-10:25, MPH
S1-515

Fermi observations of long duration gamma ray flares from the Sun

[1]

[1]Politecnico di Bari and INFN Bari

The Fermi Large Area Telescope (LAT) has detected during its first six years of operation, more than 40 solar flares with > 30 MeV gamma-ray emission. These detections sample both the impulsive phase and long-duration emission, extending up to ≈ 20 hours for the 2012 March 7 X-class flares, and include the first detection of > 100 MeV emission from a behind-the-limb flare. As a result of recent improvements to LAT data classes, the centroid of gamma-ray emission is consistently localized with the solar active region from which the flare occurred, providing clues to the acceleration mechanisms at work. Here we present an overview of LAT solar flare detections.

Thursday, 4. Sep.
14:30-15:00, MPH
S5-349

A new way of air shower detection: measuring the properties of cosmic rays with LOFAR

[1], [2]

[1]Radboud University Nijmegen

High-energy cosmic rays impinging onto the atmosphere of the Earth initiate cascades of secondary particles: extensive air showers. Many of the particles in a shower are electrons and positrons. They interact with the geomagnetic field and emit radiation, which we detect at frequencies of tens of MHz with the LOFAR radio telescope in the Netherlands. Recently, we have achieved THE break through in determining the properties of cosmic rays with the radio technique. We are now able to determine direction, energy, and type of the shower-inducing primary particle from the radio measurements. We will elaborate on the shower reconstruction, a precise description of the intensity of the radio signal at ground level (at frequencies from 10 to 240 MHz), a precise measurement of the shape of the radio wavefront, and on the reconstruction of the shower energy.

Thursday, 4. Sep.
15:45-16:00, MPH
S6-236

The KM3NeT project

[1]

[1]Laboratori Nazionali del Sud - INFN - Catania

The KM3NeT Collaboration has started the first phase of construction of a next generation high-energy neutrino telescope. With several cubic kilometres instrumented with thousands optical sensors, KM3NeT will be, when completed, the largest and most sensitive high-energy neutrino detector. Thanks to its location in the Northern hemisphere and to its large instrumented volume KM3NeT will be the optimal instrument to search for neutrinos from the Southern sky and in particular from the Galactic plane, thus making it complementary to IceCube. The full KM3NeT detector will be a distributed, networked infrastructure comprising several detector blocks. In Italy, off the coast of Capo Passero, and in France, off the coast of Toulon, the construction of the KM3NeT-It and KM3NeT-Fr infrastructures respectively is in progress. In the third candidate site, in Greece near Pylos, the deployment will start in a future phase. The technologically innovative component of the detector, the status of construction and the first results from prototypes of the KM3NeT detector will be presented as well as its capability to discover neutrino sources.

Thursday, 4. Sep.
15:30-15:45, MPH
S7-346

Timing calibration and directional reconstruction for Tunka-HiSCORE

[1], [1]

[1]DESY-Zeuthen, Platanenallee 6, 15738 Zeuthen

The Tunka-HiSCORE detector is a concept of a non-imaging wide-angle EAS Cherenkov array designed to search for gamma-rays sources above 10 TeV and to investigate CRs' spectrum and composition above 100 TeV. An engineering array with 9 stations has been deployed in October 2013 on site of Tunka experiment in Russia. We describe design and performances of the array DAQ, focusing on the timing system based on the WhiteRabbit technology. First results of EAS arrival direction reconstruction compared with MC simulation will be presented.

Thursday, 4. Sep.
12:15-12:45, MPH
S7-466

All-sky observations with HAWC: latest results

[1], *

[1]Institute of Physics and Mathematics, Universidad Michoacana

The High Altitude Water Cherenkov (HAWC) observatory is a ground-based air-shower detector designed to study cosmic rays and gamma rays with energies from 100 GeV up to 100 TeV. HAWC will survey instantaneously 2 sr of the northern sky with a high duty cycle $> 90\%$ in search for photons from point and extended sources, diffuse emission, transient events and other astrophysical phenomena at multi-TeV scales against the background of cosmic rays. In fact, the study of this background will open also the possibility of doing cosmic ray physics at the GeV-TeV regime and even to perform solar studies at HAWC. The observatory will consist of a densely packed array of 300 water Cherenkov tanks (4.5 m tall and 7.3 m diameter with 4 photomultipliers each) distributed on a $22000\,m^2$ surface. Deployment started in March 2012 on a plateau situated on the Sierra Negra Volcano in the state of Puebla, Mexico, at an altitude of 4100 m. Construction is expected to be finished by the end of 2014. In the mean time, HAWC has been taking data with a partial array and preliminary results have been already obtained. In this contribution, the results from the latest HAWC observations will be presented.

Thursday, 4. Sep.
11:45-12:15, MPH
S7-529

Supernova Remnants and Pulsar Wind Nebulae with IACTs

[1]

[1]MPIK Heidelberg

The observation of very-high-energy (VHE, E>100 GeV) gamma rays is an excellent tool to study the most energetic and violent environments in the Galaxy. This energy range is only accessible with ground based Imaging Atmospheric Cherenkov Telescopes (IACTs) that reconstruct the energy and direction of the primary gamma ray by observing the Cherenkov light from the induced air showers in the atmosphere.

The main goals of Galactic VHE gamma-ray science are the identification of individual sources of cosmic rays (CRs), such as supernova remnants (SNRs), and the study of other extreme astrophysical objects at the highest energies, such as gamma-ray binaries and pulsar wind nebulae (PWNe).

In this overview talk, I will highlight some of the most exciting studies performed on Galactic gamma-ray sources by the current generation of instruments, H.E.S.S., VERITAS, and MAGIC, over the last two years.

Thursday, 4. Sep.
11:15-11:45, MPH
S7-540

Active Galactic Nuclei and IACTs

[1]

[1]Department of Physics and Electrical Engineering, Linnaeus University, 351 95 Vaxjoe, Sweden
Active Galactic Nuclei (AGN) are the most numerous sources populating the extragalactic sky. They have been extensively studied at all wavelengths and are thought to be among the most powerful objects in the Cosmos, with their supermassive black holes at their centers and bipolar jets, accelerating particles up to the highest energies. With the advent of very-high-energy astronomy, AGN have been the first sources to be detected by pioneering experiments, helping to validate the Atmospheric Imaging Cherenkov Telescope technique. Since then, about 60 AGN have been discovered at VHE, giving the possibility to finally complete the Spectral Energy Distributions at the highest detectable photon energies, to measure extremely fast variability, and to correlate these measurements with those in other wavelength ranges; all thus giving a detailed view of the acceleration mechanism at work. They have also served as Cosmic lighthouses, allowing the study of the intervening photon and magnetic fields and even the fabric of space-time itself. Still, there is a lot to be learned on these extraordinary objects, and the CTA observatory will provide the opportunity to achieve higher photon statistics over a wider energy range, with more accurate energy and angular resolution, so giving much enriched information about the AGN population, their variability and intrinsic spectral features.

Thursday, 4. Sep.
15:00-15:15, MPH
S8-365
The CALET experiment for high-energy astroparticle physics on the ISS.
[1]

[1]IFAC (CNR), Italy
The CALorimetric Electron Telescope (CALET) is a space experiment, currently under development by Japan in collaboration with Italy and the United States, which will measure the flux of cosmic-ray electrons (and positrons) up to 20 TeV energy, of gamma rays up to 10 TeV, of nuclei with Z from 1 to 40 up to 1 PeV energy, and will detect gamma-ray bursts in the 7 keV to 20 MeV energy range during a 5 year mission. These measurements are essential to investigate possible nearby astrophysical sources of high energy electrons, study the details of galactic particle propagation and search for dark matter signatures. The main detector of CALET, the Calorimeter, has the depth, imaging capabilities and energy resolution necessary for excellent separation between hadrons, electrons and gamma rays. The instrument is currently being prepared for launch, expected in Japanese Fiscal Year 2014 (by end of March 2015) to the International Space Station ISS.

Thursday, 4. Sep.
15:15-15:30, MPH
S8-424
The Tunka experiment: from cosmic ray to gamma-ray astronomy
[1]

[1]Irkutsl State University
In 2009-2012 the Tunka-133 integrating air Cherenkov detector for cosmic rays study have been completed to the full-size array of 175 detector stations. The new TAIGA (Tunka Advanced Instrument for cosmic ray physics and Gamma Astronomy) array is a complex, hybrid detector for ground-based gamma-ray astronomy for energies from a few TeV to several PeV as well as for cosmic ray studies from 100 TeV to several 100s of PeV. Along with Tunka-133 TAIGA will include the Tunka-HiSCORE - an array of wide-angle(0.6 sr) integrating air Cherenkov stations placed on the area of $1km^2$ (at the initial phase of the experiment), to be increased to the size of $\sim 10km^2$ in future, an array of $\sim 4m$ class Imaging Atmospheric Cherenkov Telescopes and an array of particle detectors, both on the surface and underground. The physical motivations, advantages of the TAIGA project, together with the array description and the first experimental results and plans for the deployment will be reported.

Tuesday, 2. Sep.
14:30-14:45, HGH
S1-149
Charged particle transport in realistic turbulence

[1], [1], [1,2]
[1]Centre for Space Research, North-West University, [2]Lehrstuhl fr Astronomie, Universitt Wrzburg
The transport of cosmic rays in the heliosphere is dominated by the interaction with magnetic irregularities. This non-linear process has been studied by various methods so far. We consider the interaction of charged particles with plasma using numerical methods: We have used a test-particle approach in combination with MHD simulations to understand the behaviour of cosmic-rays in realistic turbulence. In this presentation the methods and its possibilities and complications are presented. We provide a comparison of this approach with the quasi-linear theory. A major application is the transport of cosmic rays in heliospheric plasmas, where particle streaming is exciting wave modes. Additionally we provide a test case for the interaction of test particles with dispersive waves as it is observed for electrons and Whistler waves in the heliosphere. This is provided by particle-in-cell methods.The transport of cosmic rays in the heliosphere is dominated by the interaction with magnetic irregularities. This non-linear process has been studied

We consider the interaction of charged particles with plasma

Tuesday, 2. Sep.
15:00-15:15, HGH
S1-170

Semi-transparent shock model for gradual solar energetic particle events

[1], [2], [3,4]
[1]Sodankyla Geophysical Observatory, University of Oulu, Oulu, Finland, [2]Jeremiah Horrocks Institute, University of Central Lancashire, Preston, UK, [3]Department of Physics and Astronomy, University of Turku, Turku, Finland, [4]Department of Physics, University of Helsinki, Helsinki, Finland
As in situ plasma observations indicate, the turbulence energy levels in neighboring magnetic tubes of solar wind may differ from each other by more than one order of magnitude. Such an intermittence of solar wind turbulence can affect the energetic particle acceleration and transport in interplanetary shocks, and can make the shock semi-transparent for SEPs. The new modeling incorporates particle acceleration in the shock front and the particle transport in both parallel and perpendicular to magnetic field directions, along with a self-consistent treatment of stochastic reacceleration of the shock accelerated particles downstream of the shock. We have modeled the diffusive shock acceleration of the sub-MeV seed particles available upstream of the shock and the transmission through the interplanetary shock wave of high-energy ions from coronal sources situated behind the shock. Particles escaping into the interplanetary space are compared with particles interacting at the Sun.

Tuesday, 2. Sep.
14:45-15:00, HGH
S1-192

The Efficiency of Surfing Acceleration of Charged Particles under Space Conditions

[1], [1]
[1]Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS
The surfing acceleration of charged particles is studied. The behavior of test particles is simulated and the spectra for free-flying, trapped particles are determined. The efficiency of surfing acceleration depends on the value of a potential jump, stream velocity, and particle distribution function injected into the acceleration process.

Tuesday, 2. Sep.
17:15-17:30, HGH
S1-271

Extended Measurement Capabilities of the Electron Proton Helium INstrument aboard SOHO - Energy Spectra up to 1 GeV and Anisotropies during GLE 71

[1], [1], [1], [1], [1]
[1]Christian-Albrechts Universitaet zu Kiel

The Electron Proton Helium INstrument (EPHIN) on board the SOlar and Heliospheric Observatory (SOHO) has performed measurements of the cosmic ray intensity at the Lagrangian point L1 since its launch in December 1995. The detector consists of a stack of six solid-state detectors enclosed in a scinitilator as anti-coincidence. The first two detectors are segmented in order to improve particle identification. By design the instrument is capable of determining the energy spectrum of hydrogen and helium up to energies of 53 MeV/n as well as electrons up to 8.3 MeV using the dE/dx-E-method. Above these energies, particles penetrate all detector elements and thus, a separation between different particle species becomes more complicated. To overcome this restriction, we developed new methods to 1) distinguish between different penetrating particles, 2) to calculate the incidence energy of a particle based on the energy deposit in the detector elements and 3) to derive the energy spectrum for penetrating ions up to almost 1 GeV/n based on GEANT4 simulations and the pulse high analyses data of the instrument. Furthermore, Monte-Carlo simulations that exploit the segmentation of the first two detectors allow a correction for different path length and the detection of anisotropies. As an example we present the EPHIN Proton spectrum from 0.1 to 1 GeV and the anisotropy variation for the Ground Level Enhancement observed on May 17, 2012 in comparison to published PAMELA results.

Tuesday, 2. Sep.
16:30-16:45, HGH
S1-287

Anisotropy observations of wide-spread solar energetic electron events with STEREO and ACE

[1,2,1,1,3,4,4,5]
[1]IEAP, University of Kiel, Germany, [2]Space Research Group, University of Alcalá, Spain, [3]AASARS, National Observatory of Athens, Athens, Greece, [4]Institut für Theoretische Physik und Astrophysik, Universität Würzburg, Germany, [5]Ioffe Physical-Technical Institute, St. Petersburg, Russian Federation

We combine energetic electron observations by the two STEREO spacecraft with ACE measurements at the Earth's longitude to investigate the longitudinal variations of wide-spread solar electron events. We scanned the whole STEREO dataset up to mid-2013 and collected 21 of such events. To be counted as a wide-spread event, a minimum longitudinal separation angle of 80 degrees is requested between the source active region at the Sun and the magnetic footpoint of one spacecraft observing the event. Special attention is paid to anisotropies to distinguish different source and transport mechanisms leading to the unexpectedly wide particle spreads. One favorable mechanism is efficient perpendicular transport in the interplanetary medium leading to vanishing anisotropies for larger separation angles. Another scenario is a large particle spread which is performed close to the Sun either due to a coronal shock or due to coronal transport. In this case, the observations at 1 AU during the early phase of the events are expected to show significant anisotropies due to the wide injection range at the Sun and particle focusing during the outwards propagation. For both of the above scenarios we find events in our sample, which suit the expected observations and even further events, which suggest a more complex scenario.

Tuesday, 2. Sep.
17:45-18:00, HGH
S1-296

What are the causes for the spread of GLE parameters deduced from NM data?

[1,2], [1,2]
[1]University of Bern, Physikalisches Institut, Switzerland, [2]International Foundation High Altitude Research Stations Jungfraujoch and Gornergrat, Bern, Switzerl

Investigations in the past have shown that the results of GLE neutron monitor (NM) data analysis for a selected event by different procedures may differ considerably. This may have significant consequences e.g. for the assessment of radiation dosages at flight altitudes. The reasons for the spread of the GLE parameters deduced from NM data are at present unclear and manifold. They include differences in specific properties of the various analysis procedures (e.g. different NM response functions, different ways in taking into account the dynamics of the Earth's magnetospheric field), different characterisations of the solar particle flux near Earth as well as the specific selection of NM stations used for the analysis. In the paper we quantitatively investigate this problem for a time interval during the maximum phase of a selected GLE. We present and discuss the changes in the resulting GLE parameters when using different NM response functions, different model representations of the Earth's magnetospheric field as well

as different assumptions for the solar particle spectrum and pitch angle distribution. The results of the study are expected to yield a basis for the reduction in the spread of the GLE parameters deduced from NM data.

Tuesday, 2. Sep.
17:00-17:15, HGH
S1-316

Observations of High Energy Solar Gamma and X-ray Emission and Solar Energetic Particles Events

0,1
[1]Space Research Institute, Moscow, Russia, [2]Moscow Institute of Physics and Technology, Russia

The Fermi Large Area Telescope (LAT) during its first 4 yr of operation detected 18 solar flares detected in ¿100 MeV gamma-rays (Ackermann et al., 2014). In this work we study in details observations of the same events by Anti-Coincidence Shield (ACS) of Spectrometer aboard INTEGRAL(SPI), which registers primary and secondary gamma rays ¿100 keV. Totally 13 events were registered by ACS SPI from the LAT flare list, six of them were solar proton events. This comparison is important since the INTEGRAL's operational orbit has a period of 72 hours, and has a high eccentricity, with perigee at 10,000 km and apogee at 153,000 km. Therefore the ACS SPI provides continuous data coverage of about 3 days in comparison with ¡ 90 min by instruments aboard FermiGRO and RHESSI situated in circular equatorial orbits. The sensitivity of ACS SPI is much better than RHESSI in the range ¿100 keV, besides in some cases ACS SPI shows enhancements of solar energetic particles(SEP) intensity earlier than do other detectors. Comparing arrival time of SEP and time of solar gamma (FermiGRO) and hard X-ray (ACS SPI) emission we will discuss the problem of SEP origin.

Tuesday, 2. Sep.
17:30-17:45, HGH
S1-337

Analysis of the cosmic ray variations and solar flare activity in October-November 2013

1, 1, 1, 2, 1
[1]Lebedev Physical Institute RAS, Moscow, Russia, [2]CRAAM-Presbiterian Mackenzie University, Sao Paulo, Brazil

We have analyzed the cosmic ray variations and solar flare activity during October-November 2013. The neutron monitor cosmic ray measurements (NMDB data set), records of the GCR cosmic ray instrument installed at CERN for the CLOUD experiment and results of cosmic ray measurements onboard GOES satellites were used in the analysis. To determine solar flare activity we have used available observations of the solar H-alpha, X-ray, gamma and radio emissions. We found cosmic ray flux increases on 15 October (17 UT) and 19 November (14 UT) observed by the GCR instrument at CERN. Characteristics of these events are similar to the events on 7 March 2011 and 23 January 2012 recorded by the CARPET cosmic ray device at astronomical complex CASLEO (Argentina). The origin of these events in relation to the solar flares, interplanetary, geomagnetic and atmospheric conditions observed in October-November 2013 are discussed.

Tuesday, 2. Sep.
16:45-17:00, HGH
S1-344

Temporal evolution of energy spectra during SEP events

1, 1, 1, 2
[1]IAPS/INAF, via del Fosso del Cavaliere 100, 00133, Roma, Italy, [2]Japan Agency for Marine-Earth Science and Technology, 3173-25 Showa-machi, Kanazawa-ku, Yokohama, 2

The evolution of the kinetic energy spectra of several SEP (Solar Energetic Particle) events have been investigated through the Shannons differential entropy during the different phases of the selected events, as proposed by Laurenza et al. (2012)*. Data from LET and HET instruments onboard the STEREO spacecraft were used to cover a wide energy range from $\sim$ 4 MeV to 100 MeV. The spectral features were found to be consistent with the Weibull like shape, both during the main phase of the SEP events and over their whole duration. Comparison of results obtained for energetic particles accelerated at corotating interaction regions

(CIRs) and transient-related interplanetary shocks are presented in the framework of shock acceleration.

*Laurenza M., Consolini G., Storini M. and Damiani A., Astrophysics and Space Sciences Transactions, 8, 1924, 2012.

Work supported by the Italian Space Agency under the contract n .I/022/10/0 and PRIN MIUR 2012.

Tuesday, 2. Sep.
15:15-15:30, HGH
S1-387

Drift induced deceleration of Solar Energetic Particles

[1], [1], [1]

[1]University of Central Lancashire, UK

Drifts associated with gradient and curvature of the Parker spiral magnetic field are known to play an important role in galactic cosmic ray transport, but are generally neglected in Solar Energetic Particle (SEP) studies. Recently it has been shown that drifts are important in the propagation of SEPs, their effect being particularly strong for partially ionised heavy ions and for protons at the high energy end of the SEP range [Marsh et al 2013, Dalla et al 2013].

We show that as a result of drift motion in the direction of the solar wind electric field, particle experience a deceleration, not included in the standard treatment of adiabatic deceleration for SEPs [Ruffolo (1995)]. We quantify this effect through full orbit test particle simulations of protons. The combined effect of adiabatic and drift induced deceleration produces a large energy change in the observer's frame of reference after four days: a decrease of between 35 and 90% of the initial kinetic energy for protons injected at 1 MeV, and between 20 and 55% for those injected at 100 MeV. Thus the effect of drift as measured in terms of kinetic energy change is very significant even for low energy protons.

Tuesday, 2. Sep.
15:30-15:45, HGH
S1-423

Statistical relationships between SEPs, flares and CMEs: a re-assessment

[1], [1], [2]

[1]LESIA - Observatoire de Paris, CNRS, Meudon, France, [2]National Research Institute of Astronomy and Geophysics (NRIAG), Helwan, Cairo, Egypt

Solar energetic particle (SEP) events are related to flares and coronal mass ejections (CMEs). Numerous attempts were undertaken in the past to distinguish between "CME shock-acceleration" and "flare acceleration" using statistical correlations between SEP intensities measured near 1 AU with parameters of the associated eruptive solar activity, especially the speed of the CME and the peak flux of the soft X-ray (SXR) burst. Two aspects distinguish this work from earlier studies. The association of microwave emission with simultaneous type III bursts at frequencies below 14 MHz is used to identify those SEP events where flare-accelerated particles escaped to interplanetary space. For these cases - 38 out of the 44 studied events – the correlation between the solar parameters and the SEP peak intensities is examined. We calculated the classical Pearson correlation coefficient and, in order to disentangle the effects of correlations between the solar parameters themselves, the partial correlation coefficients. The classical correlation analysis confirms the noisy correlations reported in previous work, with a better performance of CME speed and the fluences as compared to the SXR peak flux. The partial correlation analysis, however, shows that the only parameters that affect significantly the SEP intensity are the CME speed and the SXR fluence. We conclude that this study brings statistical evidence that both flare acceleration and CME shock acceleration contribute to the deka-MeV proton and near-relativistic electron populations in large SEP events.

Tuesday, 2. Sep.
15:45-16:00, HGH
S1-447

STEREO observations of SEP events during approaching superior conjunction

[1], [1], [1], [2]

[1]IEAP, University of Kiel, Germany, [2]Space Research Group, University of Alcala, Spain
Since the end of 2013 the two STEREO spacecraft approach the superior conjunction behind the Sun. The separation angle between STEREO A and STEREO B is less than 70. This singular constellation gives us the unique opportunity to investigate a number of individual solar energetic particle (SEP) events originating in active regions situated at the solar backside, close or between the magnetic footpoints of the nominal interplanetary field lines connecting each spacecraft with the Sun. We will present a study of a few recent particle events occurring during such orbital configuration probing their longitudinal widths and uniformity at 1 AU, and the multi-spacecraft comparison of intensity time profiles, anisotropy, and spectral characteristics.

Tuesday, 2. Sep.
11:15-11:30, HGH
S2-327

Neutron monitor measurements on the German research vessel Polarstern - First results

[1], [1]
[1]Christian-Albrechts-Universitt zu Kiel
Neutron monitors and muon telescopes are ground-based devices to measure the variation of galactic cosmic ray intensities. In contrast to measurements by spacecraft in interplanetary space the measurements are influenced by the variable Earth magnetic field and the atmospheric conditions close to its position. In order to interpret these data a detailed knowledge of the instrument sensitivity with geomagnetic latitude (rigidity) and atmospheric pressure is essential. The rigidity dependence is determined experimentally by utilizing several so called latitude scans. The Polarstern was specially designed for working in the polar seas and is currently one of the most sophisticated polar research vessels in the world. Polarstern is in the possession of the Federal Republic of Germany, represented by the Ministry of Education and Research, operated by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, and managed by the shipping company Laeisz. It spends almost 310 days a year at sea. Between November and March it usually sails to and around the waters of the Antarctic, while the northern summer months are spent in Arctic waters. In other words the vessel scans twice a year the rigidity range below the atmospheric threshold and above 10 GV. Since November 2011 a mini neutron monitor, constructed by the North West University campus Potchefstroom, and muon telescope, constructed by DESY Zeuthen, are measuring the variation of galactic cosmic rays with respect to the position of the vessel. In this presentation the measurements are presented and the pressure as well as the rigidity dependence is determined.

Tuesday, 2. Sep.
11:30-11:45, HGH
S2-334

Measurements of the Charged and Neutral Particle Spectra on the Martian Surface with MSL/RAD

[1], [2], [3], [1], [3], [1]
[1]Institute of Experimental and Applied Physics, Christian-Albrechts-University, Kiel, Germany, [2]Earth, Oceans and Space Department, Southwest Research Institute, Durham, New Hampshire, USA, [3]Space Science and Engineering Division, Southwest Research Institute, Boulder, Colorado, USA
The Radiation Assessment Detector (RAD) onboard Mars Science Laboratorys rover Curiosity is the first ever instrument to measure the energetic particle radiation environment on the surface of Mars. Charged particles are a major component of this environment, both galactic cosmic rays propagating to the Martian surface and secondary particles created by interactions of these cosmic rays with the atoms of the Martian atmosphere and soil. Another important factor for determining the biological impact of the Martian surface radiation is the specific contribution of neutrons, which possess a high biological effectiveness. In contrast to charged particles, neutrons and gamma rays are generally only measured indirectly. Their measurement is the result of a complex convolution of the incident particle spectrum with the measurement process. We apply an inversion method to calculate the gamma/neutron spectra from the RAD neutral particle measurements. Here we show first surface measurements of the Martian particle spectra and compare them to theoretical predictions. Measuring the Martian particle spectra is an essential step for determining the mutagenic influences to past or present life at or beneath the Martian surface as well as the radiation hazard for future human exploration, including the shielding design of a potential habitat.

Tuesday, 2. Sep.
11:45-12:00, HGH
S2-356

Lunar Gamma-Rays and Neutrons Measured by Kaguya Gamma-ray Spectrometer

[1,2], [1], [1,2], [1], [2], [3]

[1]Research Institute for Science and Engineering, Waseda University, Tokyo, Japan, [2]Dept. of Physics/School of Adv. Sci. and Eng., Waseda University, Tokyo, Japan, [3]Department of Physics, University of Coimbra, Coimbra, Portugal

Kaguya Gamma-Ray Spectrometer (KGRS) which was carried on the large-scale lunar polar orbiter, consists of a HPGe detector as a main detector with BGO and plastic scintillators as anticoincidence counters. It successfully observed gamma rays and neutrons emitted from elements constituting lunar surface material as well as primary cosmic ray counts. Improved maps of major elements and trace elements in the surface material were globally created with the KGRS data. Moreover, global distribution of fast neutrons emitted from the lunar surface was firstly derived on the basis of data analysis of "sawtooth" peaks in the energy spectrum observed by the KGRS, which shows a good agreement with the past observation by Neutron Spectrometer aboard Lunar Prospector. In addition, counting rates of particles observed by plastic scintillator in the KGRS are globally mapped. These results are presented and discussed.

Tuesday, 2. Sep.
12:00-12:15, HGH
S2-359

Statistical limits on isotropic CR distributions with a space detector

[1,2], [1], [1,3], [1], [1,3,4], [1], [1,5], [1,3]

[1]INFN Sezione di Milano Bicocca, I-20126 Milano, Italy, [2]Cineca, Italy, [3]Università di Milano Bicocca, I-20126 Milano, Italy, [4]European Organization for Nuclear Research, CERN, CH-1211 Geneva 23, Switzerland, [5]Università dellInsubria, I-22100 Como, Italy

The study of the cosmic ray (CR) isotropy can provide additional information to the other observables in CR research. Lack of isotropy can result crucial in probing the propagation mechanism in the heliosphere and in the galaxy. For this purpose, a space based large spectrometer can measure an unprecedented amount of particles arriving from a wider fraction of the sky. Thus we simulated a detector taking data on board of the International Space Station. We considered the peculiar conditions of operation, such as low Earth orbits and not uniform exposure over the observed sky. Moreover, applying a back-tracing code implementing the Tsyganenko 2005 external field model, we reconstructed particle trajectories inside the Earth magnetosphere. Thus, we were able to recover the CR arrival directions at the magnetosphere border during both quiet and active solar periods. Using a shuffling technique, we investigated the resulting statistical limits in the determination of a simulated isotropic sky.

Tuesday, 2. Sep.
12:15-12:30, HGH
S2-374

Deuteron and proton spectra measurements under radiation belt with PAMELA instrument

[1]

[1]National Research Nuclear University MEPhI

In this work the results of data analysis of the deuterons and protons albedo radiation obtained in the PAMELA experiment are presented. PAMELA is an international cosmophysical experiment carried out on board of the satellite Resurs DK-1. The high precision detectors allows to registrate and identify cosmic ray particles in a wide energy range. Deutron and proton spectra in the energy range 100 - 360 MeV/nucleon has been measured.

Tuesday, 2. Sep.
12:30-12:45, HGH

S2-378

A Mars Year of Forbush Decreases on the Martian Surface

[1], [2], [3], [3], [4], [3], [4], [4]

[1]NASA Headquarters, Washington DC, USA, [2]Southwest Research Institute, Durham NH, USA, [3]IEAP, Christian-Albrechts-Universitaet Kiel, [4]NASA Goddard Space Flight Center, Greenbelt MD, USA

We report on measurements of more than 100 Forbush decreases on the surface of Mars over nearly one complete Martian year (the equivalent of 1.88 Earth years). For our study we use observations from the Mars Science Laboratorys Radiation Assessment Detector (RAD) over the time period from shortly after landing in August 2012 to mid-2014. We characterize the observed Forbush decreases with respect to frequency, magnitude, and duration. For a subset, we identify individual drivers of the Forbush decreases on Mars, i.e. recurrent and transient structures in the inner heliosphere. To do so we utilize the data-driven WSA-ENLIL model and observations provided by SOHO and from the two STEREO spacecraft at various solar longitudes near 1 AU. As separation distances of Mars from spacecraft locations vary with time, solar longitude, latitude, and distance from the Sun, we focus on specific alignment periods for more detailed analyses. Additional Co-authors include the MSL RAD Science Team and members of the NASA/GSFC CCMC: L. Berger, N. Dresing, C. Drews, J. Guo, K. Herbst, P. Kuehl, P. MacNeice, J. P. Andrews, R. Beaujean, S. Boettcher, D. E. Brinza, M. A. Bullock, S. Burmeister, F. A. Cucinotta, B. Ehresmann, M. Epperly, D. Grinspoon, D. M. Hassler, M.-H. Kim, J. Koehler, O. Kortmann, C. Martin-Garcia, R. Mueller-Mellin, K. Neal, S. C. R. Rafkin, G. Reitz, L. Seimetz, K. D. Smith, Y. Tyler, and E. Weigle.

Tuesday, 2. Sep.
12:45-13:00, HGH
S2-459

Search for a positron anisotropy with PAMELA experiment

[1], [2], [2], [1], [3]

[1]National Research Nuclear University "MEPhI", Moscow, Russia, [2]National Institute of Nuclear Physics, Naples, Italy, [3]National Institute of Nuclear Physics, Trieste, Italy

The PAMELA experiment is collecting data on board Resurs DK1 satellite since 2006. Its results indicate an increasing of positron fraction respect to electrons in the cosmic rays above 10 GeV. The origin of positron excess might be deal with an astrophysical objects such as pulsars and SNRs or with dark matter annihilation. Spatial distributions of electrons and positrons events collected by PAMELA have been analized searching for anisotropies from possible local sources. The paper presents method of analysis and results in galactic and solar reference frames.

Tuesday, 2. Sep.
11:15-11:30, MPH
S4-112

Cosmic rays in astrospheres

[1], [2], [2], [1,2]

[1]Institut für Theoretische Physik IV: Weltraum- und Astrophysik, Ruhr-Universität Bochum, Germa, [2]Centre for Space Research, North-West University, 2520 Potchefstroom, South Africa

We model the cosmic ray flux in a stellar wind cavity of a O or B type star using a transport model based on stochastic differential equations. The required parameters, for example the coefficients of the diffusion tensor, are determined from an underlying magneto-hydrodynamical model. We discuss the transport in different astrospheric models with varying parameters for the transport coefficients. We will argue that large stellar wind cavities can act as sinks for the galactic cosmic ray flux.

Tuesday, 2. Sep.
11:30-11:45, MPH
S4-151

PAMELA measurements of the boron and carbon spectra

[1]

[1]University of Florence and INFN Florence

The satellite-borne PAMELA experiment is aimed at precision measurements of the charged light component of the cosmic-ray spectrum. It consists of a magnetic spectrometer, a time-of-flight system, an electromagnetic calorimeter with a tail catcher scintillatin layer, an anticoincidence system and a neutron detector. The PAMELA collaboration has finalized the measurement of the absolute fluxes of boron and carbon and of the B/C ratio, which plays a central role in galactic propagation studies in order to derive the injection spectra at sources (both astrophysical and exotic) from measurements at Earth. The data analysis techniques and the final results will be presented.

Tuesday, 2. Sep.
11:45-12:00, MPH
S4-155

Vela as the source of cosmic rays responsible for the formation of the knee

[1,2], [2]

[1]P.N.Lebedev Physical Institute, Moscow, Russia, [2]Department of Physics, Durham University, UK

Simulation of the cosmic ray propagation from a young and nearby supernova remnant demonstrates a strong dependence of the energy spectrum on the supernova age and its distance from the Earth. A comparison of model calculations with experimental data shows, that if cosmic rays leave the acceleration region soon after the supernova explosion, then the best agreement between calculations and experiments is obtained for(9+/-0.5)10**3 y after the explosion and at its distance of (250+/-50) pc. In this range of time and distance the most suitable source is the Vela cluster including Vela X and Vela Jr. Independently, the possible role of this source is supported by several experimental facts. The first one is the observed rise of the dipole amplitude and the change of the anisotropy phase in the PeV energy region. The second one is the analysis of the difference in the characteristics of extensive air showers the maximum of which is observed for showers coming from the direction towards this source and from an opposite direction. The third one is the closeness of Vela to the region of an enhanced intensity of showers observed at the IceTop array. These facts show that with a high probability the Vela cluster can be the source of particles responsible for the formation of the knee in the cosmic ray energy spectrum.

Tuesday, 2. Sep.
12:00-12:15, MPH
S4-167

H, He, Li and Be Isotopes in the PAMELA-Experiment

[1], [2], [2], [2], [3], [4]

[1]University of Siegen, Siegen, Germany, [2]IOFFE Physico-Technical Institute, St. Petersburg, Russia, [3]INFN and University of Trieste, Trieste, Italy, [4]INFN and University of Rome Tor Vergata, Rome, Italy

On the 15th of June 2006, the PAMELA satellite-borne experiment was launched from the Baikonur cosmodrome and it has been collecting data since that time. The apparatus comprises a time-of-flight system, a magnetic spectrometer (permanent magnet) with an silicon-microstrip tracking system, an imaging calorimeter built from layers of silicon-microstrip detectors interleaved with plates of tungsten, an anti-coincidence system, a shower tail scintillator-counter and a neutron detector. The scientific objectives addressed by the mission are the measurement of the antiprotons and positrons spectra in cosmic rays, the hunt for antinuclei as well as the determination of light nuclei fluxes from hydrogen to oxygen in a wide energy range and with high statistics. The instrument in its detector combination is also capable to identify isotopes. In this paper the identification capability for light nuclei isotopes (from hydrogen to beryllium) using multiple dE/dx measurements in the calorimeter will be shown and and results of the isotopic ratios will be presented.

Tuesday, 2. Sep.
16:30-16:45, MPH
S4-178

The high energy electron spectrum measurements with the PAMELA calorimeter
[1]

[1]NRNU MEPhI
We present a new measurement of the cosmic ray electron-positron spectrum by the PAMELA experiment with two methods. The one method for electron-proton separation uses the sampling electromagnetic calorimeter (the energy range up to 1.5 TeV) and the second one in addition involves the neutron detector (the energy range up to 3 TeV). The obtained statistics for the period 2006-2013 with a special trigger of a bottom scintillation detector extending the PAMELA observational energy range based on the magnetic spectrometer measurements.

Tuesday, 2. Sep.
15:15-15:30, MPH
S4-183
Explaining the knee by Cosmic Ray Escape from the Galaxy
[1], [2], [3]

[1]NTNU, [2]APC, [3]Oxford
We suggest that the cosmic ray (CR) knee is entirely explained by the energy dependent CR leakage from the Milky Way. Calculating the trajectories of individual CRs propagating in the regular and turbulent Galactic magnetic field, we have studied the escape of CRs with energies between $E/Z = 10^{14}$ eV and 10^{17} eV from our Galaxy. Determining the escape time $\tau_{esc}(E)$ of CRs, we find a knee-like structure of τ_{esc} around $E/Z = few \times 10^{15}$ eV for a coherence length $l_c \simeq 10$ pc of the turbulent field, while the decrease of $\tau_{esc}(E)$ slows down around $E/Z \simeq 10^{16}$ eV in a model with a weak turbulent magnetic field. Assuming power-laws for the injection spectra of CR nuclei, the changing slope of $\tau_{esc}(E)$ is sufficient to explain the observed energy spectra of CR nuclei. We determine the resulting CR dipole anisotropy as well as the source rate in this model.

Tuesday, 2. Sep.
12:30-12:45, MPH
S4-211
Spectrum and fraction of cosmic ray positrons: results of the anomalous diffusion approach
[1], [1], [1]

[1]Altai State University, Radiophysics and Theoretical Physics Department
According to standard scenario cosmic ray positrons are injected in the Galaxy only in secondary production. Under these assumptions the positron fraction should decrease when the energy increase. However, new experimental results obtained in the last decade by PAMELA, Fermi-LAT and AMS-02 collaborations contradict to the standard scenario predictions. An excess of positrons in cosmic rays for the energy $E > 10$ GeV in above experiments was found. New results on the spectrum of positrons are stimulated the development of new theoretical models to explain this phenomenon. Some of these models imply the existence of a primary sources of positrons.

The main goal of this report is discuss the possible contribution due to pulsars and other sources to observed positrons spectra. The anomalous diffusion model was implemented to describe the particles propagation from sources in the Galaxy. It is shown a good agreement between our modelling and the experimental data in the whole energy range.

Tuesday, 2. Sep.
15:30-15:45, MPH
S4-299
Cosmic-ray spectral anomaly at GeV-TeV energies
[1], [1]

[1]Radboud University Nijmegen, Netherlands
Recent measurement of cosmic rays by the ATIC, CREAM and PAMELA experiments have found that the energy spectrum in the TeV region is harder than at GeV energies. The origin of the hardening is not clearly understood. Suggested explanations

include hardening in the cosmic-ray source spectrum, changes in the cosmic-ray propagation properties in the Galaxy, and the effect of the nearby sources. In this contribution, I will discuss the possibility that the spectral anomaly might be an effect of re-acceleration of cosmic rays by weak shocks in the Galaxy. After acceleration by strong supernova remnant shock waves, cosmic rays undergo diffusive propagation in the Galaxy. During the propagation, cosmic rays may again encounter expanding supernova remnant shock waves, and get re-accelerated. As the probability of encountering old supernova remnants is expected to be larger than the younger remnants due to their bigger size, the re-acceleration is expected to be produced mainly by weaker shocks. As weaker shocks generate a softer particle spectrum, the resulting re-accelerated component will have a spectrum steeper than the initial cosmic-ray source spectrum produced by strong shocks. For a reasonable set of model parameters, I will show that such re-accelerated component can dominate the GeV energy region while the non-reaccelerated component dominates at higher energies, thereby explaining the observed GeV-TeV spectral anomaly.

Tuesday, 2. Sep.
15:45-16:00, MPH
S4-410
The spectrum of cosmic rays in the energy range of 10^{14} - 10^{18} eV
[1], [2]
[1]Institut fur Kernphysik, Karlsruhe Institute of Technology (KIT), Germany, [2]https://web.ikp.kit.edu/KASCADE/
The KASCADE experiment and its extension KASCADE-Grande have significantly contributed to the current knowledge about the energy spectrum and composition of cosmic rays (CRs) with energies between the knee and the ankle. However, the data of both experiments were analysed separately, although Grande used the muon information of the KASCADE-array. A coherent analysis based on the combined data of both arrays is expected to profit from reconstructed shower observables with even higher accuracy compared to the stand-alone analyses. In addition, a significantly larger fiducial area is available.

The aim of this analysis is to obtain the spectrum and composition of CRs in the range from 10^{14} to 10^{18} eV with a larger number of events and further reduced uncertainties using one unique reconstruction procedure for the entire energy range. This contribution will be a short review of the analysis procedures of the individual arrays, as well as the concept and the current status of the combined analysis.

Tuesday, 2. Sep.
12:45-13:00, MPH
S4-425
Energy determination with the HiSCORE-9 array
[1]
[1]University of Hamburg
HiSCORE is a project of non-imaging wide-angle Cherenkov array for the detection of extensive air showers induced by ultrahigh energy gamma-rays above 10 TeV and cosmic ray studies above 100 TeV. Last autumn a 9-station engineering array has been deployed in Tunka valley. We present the first results on the amplitude and energy reconstruction of the data and discuss the cross-calibration with the Tunka-133 array.

Tuesday, 2. Sep.
14:30-14:45, MPH
S4-450
Spectra of electrons, protons and alfa-particles according to measurements from the Pamela spectrometer
[1], [1], [2]
[1]Lebedev Physical Institute of the Russian Academy of Sciences, [2]Pamela collaboration
From the measurements made with Pamela spectrometer onboard of the satellite of Resurs DK-1 the spectra of electrons (electrons + positrons), protons and alfa-particles were obtained in a wide energy interval (70 1000 GeV). To select electrons from protons the neutron detector data have been used. The analysis of experimental data shows that the dependence of neutron number from

electron and proton after their interaction in the calorimeter depends on the energy Q released in the calorimeter. For the same values of Q in nucler cascade the neutron number is larger than in electromagnetic one. The selection of electron events from proton ones was carried out in 2 steps. The first, the selection was made with computer according to the set of some parameters. The second step included the visual inspection of each selected event. The use of these two methods gave us to carry out the selection of electrons with very high efficiency and to get the reliable spectra of particles.

Tuesday, 2. Sep.
14:45-15:00, MPH
S4-470
Measurement of the all-particle and light-component energy spectra with ARGO-YBJ
[1], [2]
[1]Universita' del Salento and INFN, Lecce, Italy
Cosmic ray physics in the 1TeV-10PeV primary energy range is among the main scientific goals of the ARGO-YBJ experiment. The detector, located in the Cosmic Ray Observatory of Yangbajing (Tibet, China) at 4300m a.s.l., is a full coverage Extensive Air Shower array, consisting of a carpet of Resistive Plate Chambers (RPC) of about 7000m2. The apparatus layout, performance and location offer a unique opportunity for a detailed study of several characteristics of the cosmic ray flux. Moreover the analog readout of the RPC signals indeed provides a powerful tool to study, with unprecedented resolution and without saturation, the extensive air shower space-time structure down to few meters from its axis. New results concerning the measurement of the all-particle and of the light-component (i.e. protons and helium) energy spectra, between approximately 5 TeV and 5 PeV, will be reported. The study of this energy region is particularly important not only for a better understanding of the so called knee of the energy spectrum and of its physical origin, but also as a powerful cross check among very different experimental methods (e.g. direct vs indirect measurements).

Tuesday, 2. Sep.
15:00-15:15, MPH
S4-481
Recent highlights from ARGO-YBJ
[1]
[1]INFN - Sezione Roma Tor Vergata
The ARGO-YBJ experiment has been in stable data taking for 5 years at the YangBaJing Cosmic Ray Observatory (Tibet, P.R. China, 4300 m a.s.l., 606 g/cm^2). With a duty-cycle greater than 86% the detector collected about 5×10^{11} events in a wide energy range, from few hundreds GeV up to the PeV. A number of open problems in cosmic ray physics has been faced exploiting different analyses. In this talk we summarize the latest results in gamma-ray astronomy and in cosmic ray physics.

Tuesday, 2. Sep.
16:45-17:00, MPH
S4-486
Study of extensive air shower structure around the axis with ARGO-YBJ
[1]
[1]INFN Sezione di Lecce - Italy
The peculiar features of the ARGO-YBJ detector, i.e. the full-coverage layout and charge readout segmentation, allow the study, with unprecedented resolution and without detector saturation (up to very high particle densities), of the extensive air-shower space-time structure very close to its axis. Furthermore, the detector location at high altitude (the Cosmic Ray Observatory of Yangbajing in Tibet, China, at about 606 g/cm2 of atmospheric depth), ensures the shower development fluctuations to be reduced thanks to the proximity of the shower maximum. The measured lateral distribution of particle density (LDF) is shown to be properly described, even down to few meters near the shower axis, by a suitably modified Nishimura-Kamata-Greisen function. The shape parameter of such function is clearly related to the shower age by a universal behavior which is independent from the

primary, thus allowing mass composition studies in the transition energy region from direct to indirect measurements. That features make also possible to investigate several characteristics of the hadronic interactions in the very forward region up to TeV center of mass energy, thus giving new inputs to the models currently used for the study of cosmic ray flux and its origin up the highest energies.

Tuesday, 2. Sep.
12:15-12:30, MPH
S4-563
Understanding the anisotropy of cosmic rays in the TeV-PeV energy range
[1]
[1]

Tuesday, 2. Sep.
17:00-17:15, MPH
S5-128
Results from the Telescope Array Experiment
[1]

[1]University of Utah
The Telescope Array (TA) is the largest experiment studying ultrahigh energy cosmic rays (E above 1 EeV) in the northern hemisphere. Results on the spectrum, composition, and anisotropy of cosmic rays will be presented. The TA Low Energy Extension (TALE) is a series of new detectors that is studying cosmic rays at lower energies (E above 10 PeV). The first TALE results will be presented also.

Tuesday, 2. Sep.
17:15-17:30, MPH
S5-162
Cosmic ray mass composition measurements with LOFAR
[1],
[1]Radboud University Nijmegen
It is generally believed that ultra-high-energy cosmic rays are produced in extragalactic sources like gamma-ray bursts or active galactic nuclei, while the lower energy cosmic rays come from our own Galaxy. At what energy the transition from Galactic to extragalactic origin takes place is still a mystery, but most models place it somewhere between 10^{17} and 10^{19} eV. With LOFAR we can measure the mass composition of cosmic rays in this important regime and disentangle the Galactic and extragalactic components.

LOFAR detects the radio signals of cosmic rays while running astronomical observations at the same time. In the dense core individual air showers are detected by hundreds of dipole antennas. The raw electromagnetic waveform as detected by each antenna is stored in a five-second ring buffer, which is read out when a trigger is issued by the LORA particle detector array. Hundreds of showers with energies above 10^17 eV have been measured in two frequency regimes: low band (10-90 MHz) and high band (110-250 MHz).

The complicated radio pattern on the ground can be accurately reproduced by modern radio simulation codes and contains information about the longitudinal shower development. With a hybrid reconstruction technique, we can accurately reconstruct the interaction depth of cosmic rays, and infer their mass composition. We present an analysis based on the first results, revealing a strong proton component below 10^{18} eV.

Tuesday, 2. Sep.

17:30-17:45, MPH
S5-230
Measurements of the muon content of air showers at the Pierre Auger Observatory
[1], [2]
[1]Departamento de Física de Partículas e IGFAE, Universidade de Santiago de Compostela, Spain, [2]Full author list: http://www.auger.o
The Pierre Auger Observatory offers a unique window to study cosmic rays and particle physics at energies above 3 EeV (corresponding to a center-of-mass energy of 75 TeV in proton-proton collisions) inaccessible to accelerator experiments. We discuss the different methods of estimating the number of muons in showers recorded at the Pierre Auger Observatory, which is an observable sensitive to primary mass composition and to properties of the hadronic interactions in the shower. The muon content, derived from data with these methods, is presented and compared to predictions from the post-LHC hadronic interaction models for different primary composition. We find that models do not reproduce well the Auger observations, displaying a deficit of muons at ground. In the light of these results, a better understanding of ultra-high energy extensive air showers and hadronic interactions is crucial to determine the composition of ultra-high energy cosmic rays. We report on the upgrade plans of the Pierre Auger Observatory to achieve this science goal.

Tuesday, 2. Sep.
17:45-18:00, MPH
S5-233
Propagation of UHECRs in Cosmic Magnetic Fields
[1], [2], [2], [1]
[1]University of Hamburg, [2]University of Oxford
The origin and nature of the ultra-high energy cosmic rays (UHECRs) is one of the main challenges in high energy astrophysics. UHECRs can be charged particles and therefore be affected by the intervening cosmic magnetic fields, namely the galactic and extragalactic. In this work we use magnetic fields coming from a magnetohydrodynamical simulation of the local universe to propagate hadronic UHECRs. We show that the influence of cosmic magnetic fields on the propagation of cosmic rays is hard to be assessed, and discuss the prospects for UHECR astronomy.

Tuesday, 2. Sep.
09:40-10:20, MPH
S6-541
Understanding high energy neutrinos
[1,2]
[1]Dipartimento di Fisica, Universita di Roma la Sapienza, Rome, Italy, [2]I.N.F .N., Sezione di Roma, P .A. Moro 2, Rome, Italy
The fluxes of high energy neutrinos from astrophysical sources are observed against a foreground of atmospheric neutrinos, generated in cosmic ray showers in the Earth's atmosphere. In this contribution we will discuss the expected properties of the atmospheric foreground and of possible astrophysical signals, and the methods to disentangle the different components. Measurements of the atmospheric neutrino fluxes at high energy have the potential to give valuable information about the composition of the cosmic rays fluxes around the knee energy and also the properties of the production of charmed particles in hadronic interactions. The recent IceCube results will be discussed in this context.

Tuesday, 2. Sep.
09:00-09:40, MPH
S6-566
Status of High-Energy Neutrino Astronomy
[1]
[1]

Tuesday, 2. Sep.
10:20-10:45, MPH
S6-567
The Astrophysics of Cosmic Ray Anisotropy: a Review.
[1]
[1]

Wednesday, 3. Sep.
12:00-12:30, HGH
S1-127
Earths magnetic field as analyzer of the cosmic ray ions charge
[1], [1], [1], [1]
[1]National Research Nuclear University MEPhI, 31 Kashirskoe shosse, 115409 Moscow, Russia
As the direct cosmic ray ion charge measurement with the energies more than several MeV/ nucleon is impossible the unique way to determine a charge state of ions at these energies is using the Earths magnetic field as particle separator. A depth of penetration inside the magnetosphere depends on ion rigidity. It can be fixed as a flux cutoff for given particle rigidity at a certain magnetic L-shell when moving on board of polar-orbiting satellite from a pole to the equator. Knowledge L-shell dependence on particle rigidity and measuring the ion energy give it possible to determine an ion charge.

The present contribution presents the main results of experimental analysis and Monte-Carlo simulation of geomagnetic separator technique possibility for the study of cosmic ray ion charge state composition in the energy range from the several MeV/nucleon till hundreds of MeV/nucleon.

Wednesday, 3. Sep.
11:30-11:45, HGH
S1-169
A Novel Forecasting System for Solar Particle Events and Flares (FORSPEF)
[1], [1], [1], [2], [1], [1], [3]
[1]National Observatory of Athens, Institute for Astronomy, Astrophysics, Space Applications and Remote, [2]Academy of Athens, Research Center for Astronomy and Applied Mathematics, Greece, [3]European Space Agency, European Research and Technology Center, The Netherlands
Solar Energetic Particle (SEP) events result from intense solar eruptive events such as solar flares and coronal mass ejections (CMEs) and pose a significant threat for both personnel and infrastructure in space conditions. In this work, we present FORSPEF (Forecasting Solar Particle Events and Flares), a novel dual system that is designed to perform forecasting as well as nowcasting of both solar flares and SEP events. In order to predict solar flares, an assessment of potentially flaring active-region magnetic configurations is performed. Concerning SEP events, we make use for the first time of the calibrated GOES proton data within the energy range 6.0-243 MeV and we build our statistics on an extensive time interval that includes roughly 3 solar cycles (1984-2013). A new comprehensive catalogue of SEP events based on these data has been compiled including solar associations in terms of flare (magnitude, location) and CME (width, velocity) characteristics, as well as radio burst (Type III and Type II) signatures. This is the core of the FORSPEF SEP forecasting system. We present and discuss both the forecasting module and the results of the statistical analysis.

Wednesday, 3. Sep.
17:45-18:00, HGH
S1-199

On the method of the GCR partial intensities related to the main physical processes
[1]

[1]Lebedev Physical Institute, RAS, Moscow, Russia
At ECRS-2012 we suggested the method to decompose the calculated GCR intensity into the partial "intensities" connected with the main physical processes: the diffusion, convection, adiabatic cooling and magnetic drift. Later (ICRC-2013) the method was applied to understanding the mechanisms forming the time profiles of the GCR intensity near the Earth during the last three periods of low solar activity. In the talk we discuss the method and its limitations in more details. Besides we illustrate how the method can be applied to the mechanisms forming space and energy distributions of the GCR intensity for any moment characterized by some set of the main parameters.

Wednesday, 3. Sep.
15:15-15:30, HGH
S1-200
Correlation of the quasi-biennial variations in galactic cosmic rays and the solar activity indices
[1, 1, 1, 1, 1, 1]

[1]Lebedev Physical Institute of Russian Academy of Sciences
The quasi-biennial oscillations (QBO) are recognized as one of the basic types of solar activity variations. They are observed at all levels of solar atmosphere and are translated to the heliosphere via open solar magnetic flux. As a result the best correlation is observed between the QBOs in galactic cosmic ray (GCR) fluxes and QBOs in heliospheric magnetic field (HMF) strength while correlation between QBOs in GCR fluxes and sunspot area index is low. QBOs in the HMF tilt angle are in phase with QBOs in GCR only at periods of low solar activity. We try to understand the found correlations in the context of the contemporary ideas on the GCR modulation.

Wednesday, 3. Sep.
15:00-15:15, HGH
S1-248
Modeling of the galactic cosmic ray density variations in the magnetic clouds.
[1, 1, 1, 1, 1, 1, 2, 2]

[1]Pushkov Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation, RAS (IZMIRAN), [2]2 Nuclear and Particle Physics Section, Physics Department, National and Kapodistrian University of
The variations of density of the galactic cosmic rays obtained by the global survey method from the world wide neutron monitor network, were studied for 99 events identified with the magnetic clouds. The model, capable to describe distribution of cosmic ray density in a magnetic cloud is considered, and is shown that in most cases (but not in all) the behavior of CR density in a magnetic cloud at Earth can be described by a simple parabolic dependence on the distance measured in gyroradiuses. The majority of magnetic clouds modulate cosmic rays, reducing their density, but there is a group of events (about 1/5 part) in which in a magnetic cloud density of CR increases. Events with a positive effect have a maximum, generally in leading part of a cloud. In events with a negative effect minima are distributed more evenly, but tend to be grouped in tail part of a cloud. A number of the factors giving a contribution to the model description is considered, and estimates of these deposits are carried out.

Wednesday, 3. Sep.
14:30-14:45, HGH
S1-272
Magnetic cloud properties as observed by Helios mission
[1, 1]

[1]SRG-UAH
Helios mission provided measurements of in situ properties of solar wind and interplanetary magnetic field from 0,3 to 1 AU during more than ten years in the final quarter of the twentieth century. This mission was integrated by two twin spacecraft giving the

possibility of studying the inner heliosphere from a multi-spacecraft observation approach. This capability made Helios an ideal experiment to study wide solar wind structures such as magnetic clouds. This work presents the analysis of 35 magnetic clouds observed by Helios spacecraft. Based on this study some conclusions from a statistical point of view are arisen with respect magnetic cloud properties about deceleration, expansion and magnetic field decrease with Sun-radial distance.

Wednesday, 3. Sep.
17:30-17:45, HGH
S1-285
Solar modulation of GCR electrons over the 23rd solar minimum with PAMELA
[1,2]

[1]Universita' degli studi di Trieste, [2]INFN-Trieste
The satellite-borne PAMELA experiment has been continuously collecting data since 15th June 2006, when it was launched from the Baikonur cosmodrome to detect the charged component of cosmic rays over a wide energy range and with an unprecedented statistics. The apparatus design is particularly suited for particle and antiparticle identification. The PAMELA experiment has measured the electron spectrum at Earth in great detail,extending up to about 100 GeV, and now, with a special effort, down to about 70 MeV. The yearly galactic cosmic ray electron spectrum measured during the A<0 solar minimum of solar cycle 23 (2006-2009) will be presented. These fluxes provide important informationfor the study of charge dependent solar modulation effects.

Wednesday, 3. Sep.
17:15-17:30, HGH
S1-308
Spatial gradients of low-GeV GCR protons and alpha particles in the inner heliosphere obtained from PAMELA and Ulysses observations
[1, 2, 2,3, 1, 4,5, 6, 6]

[1]IEAP, University of Kiel, Kiel, Germany, [2]INFN Sezione di Rome 'Tor Vergata', Rome, Italy, [3]Agenzia Spaziale Italiana (ASI) Science Data Center, Rome, Italy, [4]University of Rome 'Tor Vergata', Rome, Italy, [5]INFN Laboratori Nazionali di Frascati, Frascati, Italy, [6]Centre for Space Research, North-West University, Potchefstroom, South Africa
The spacecraft Ulysses was launched on the 6th of October 1990, placed in an elliptical, high inclined (80.2 degrees) orbit around the Sun, and was finally switched off after more than in 18 years in June 2009. It has been the only spacecraft exploring high-latitude regions of the inner heliosphere. The Kiel Electron Telescope (KET) aboard Ulysses measures electrons from 3 MeV to a few GeV, and protons and helium in the energy range from 6 MeV/nucleon to above 2 GeV/nucleon. Due to the spacecraft's trajectory, its measurements reflect not only the temporal variation of energetic particles but also their spatial distribution. In order to investigate the radial and latitudinal gradients of galactic cosmic rays (GCR), it is essential to have an additional 'baseline' measurement, delivering the temporal variation for a stationary observer. This is accomplished by the PAMELA (Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics) space borne experiment that was launched on the 15th of June 2006 and is continuously collecting data since then. The apparatus measures electrons, positrons, protons, antiprotons and heavier nuclei from about 100 MeV to several hundreds of GeV. With these tools at hand, we have the opportunity to determine the spatial gradients of GCR protons and alpha particles at about 0.1 to 1 GeV/n in the inner heliosphere during the extended minimum of solar cycle 23. In addition, we take advantage of a comprehensive numerical model for the solar modulation of cosmic rays that was used to reproduce the PAMELA proton intensity spectra from 2006 to 2009. We then compare our gradients derived from spacecraft measurements with results obtained from the numerical model.

Wednesday, 3. Sep.
12:15-12:30, HGH
S1-323
Influence of Ground Level Enhancements on the Terrestrial Production of ^{10}Be, ^{14}C and ^{36}Cl

[1], [2], [1], [3], [4]
[1]IEAP, Christian-Albrechts-Universität zu Kiel, Kiel, Germany, [2]Swiss Federal Institute of Aquatic Science and Technology, EAWAG, Switzerland, [3]Space Science Division, Naval Research Laboratory, Washington, DC, USA, [4]Praxis, Inc., Alexandria, VA, USA
Cosmogenic radionuclides (CNs) such as ^{10}Be, ^{14}C and ^{36}Cl are a product of the interaction of high energetic primary cosmic rays, in particular galactic cosmic rays (GCRs), with the Earths atmosphere. Because GCRs are modulated by the solar activity on their way through the interplanetary medium the GCR-induced production of CNs is anti-correlated to the solar cycle. Furthermore, during phases of strong solar activity also solar energetic particle (SEP) events occur frequently. In particular Ground Level Enhancements (GLEs), strong SEP events which can be detected by ground-based instruments like Neutron Monitors, may strongly contribute to the production of CNs. Besides the variation due to the modulation of GCRs we will investigate the influence of 58 out of the 71 GLEs which occurred within the past five solar cycles and discuss the possibility to detect such events in present ice-core and tree-ring records. Moreover, an estimate for the probability to find such events over the past 10000 years, also known as Holocene, will be given.

Wednesday, 3. Sep.
14:45-15:00, HGH
S1-329

The connection of the interplanetary magnetic field turbulence and rigidity spectrum of Forbush decrease of the galactic cosmic ray intensity

[1], [2]
[1]Institute of Computer Science, Siedlce University, Siedlce, Poland, [2]Institute of Math. And Physics, Siedlce University, Siedlce, Poland
We analyze the temporal changes of the rigidity spectrum of Forbush decrease (Fd) of the galactic cosmic ray (GCR) intensity in different energy ranges based on the hourly data of from worldwide network of neutron monitors and ground muon telescopes. We show that the changes of the rigidity spectrum of Fd are linked to the evolution/decay of the turbulence of the interplanetary magnetic field (IMF) during various phases of the Fd. We analyze the time-evolution of the state of the turbulence of the IMF in various frequency ranges during Fd. The analysis shows that the decrease of the exponent ν of the Power Spectral Density ($PSD \propto Pf^{-\nu}$, where P is power and f is a frequency) with decreasing frequency resulted in the softer rigidity spectrum of Fd for GCR particles with higher energies. To study the temporal changes of the IMF turbulence during Fd, apart the Fourier analysis we apply the wavelet time frequency spectrum technique.

Wednesday, 3. Sep.
15:30-15-45, HGH
S1-355

H.E.A.M.S., the Adelaide High Energy Astrophysics Muon System.

[1], [1], [1], [2], [3]
[1]University of Adelaide, South Australia, [2]Bureau of Meteorology, Australia, [3]King Abdulaziz City For Science and Technology, Riyadh, Saudi Arabia
For many years, there have been astrophysical muon detection systems operated at the University of Adelaide, originally for teaching at advanced undergraduate and Masters levels. The detectors have recently been rebuilt and upgraded with a new data acquisition system, to become HEAMS. The new system consists of a one square metre vertical telescope on the University Campus and a four square metre multi-directional FPGA-based telescope at Buckland Park. The latter system operates under a light roof and responds to lower energy muons than the Campus system, which is placed three floors below the roof of its building. The properties of the new system, including its various pressure coefficients, will be discussed, with illustrations of short term variations and solar and sidereal anisotropies.

Wednesday, 3. Sep.

17:00-17:15, HGH
S1-368
Treatment of maximum solar Activity with HelMod Propagation Model
[1,2], [1], [1,3], [1], [1,3,4], [1], [1,5], [1,3]
[1]INFN Sezione di Milano Bicocca, I-20126 Milano, Italy, [2]Cineca, Italy, [3]Universita' di Milano Bicocca, I-20126 Milano, Italy, [4]European Organization for Nuclear Research, CERN, CH-1211 Geneva 23, Switzerland, [5]Universita' dellInsubria, I-22100 Como, Italy
Cosmic rays entering in the heliospheric region propagate into an expanding medium out-flowing from the Sun (i.e. the solar wind). This causes particles to diffuse into the heliosphere loosing energy causing the so called Solar Modulation, the decreasing of cosmic ray differential intensity below 30 GeV. The Solar Modulation could be more or less intense, following the solar activity, with greater effects during period of higher activity. Using the HelMod Monte-Carlo code, we explore the effect of high solar activity on cosmic ray intensity as function of time and at different energies during present solar maximum. We implement short time description of the diffusion coefficient based on neutron monitor measurements. This has to be done to account for the high variability during high activity period, in which an important day by day variation is observed in the Cosmic ray flux. This description is then propagated into the whole heliosphere at the average speed of solar wind.

Wednesday, 3. Sep.
11:45-12:00, HGH
S1-376
Occurrence rate of SEP events: Recent progress and some constraints
[1−IZMIRAN],
[1]SINP MSU
The present work has been accomplished by new methodical procedures whose application becomes possible due to accumulation and/or appearance of new observational data on SEP fluxes and fluences in the past (1561-1950). Our main result is that a form of SEP distribution function obtained earlier by the data on fluences for three last cycles of solar activity (SA) has been completely confirmed by the data for about 41 solar cycles (Miroshnichenko and Nymmik, Rad. Measurements, 2014). In our study we were guided by a concept of the upper limit spectrum (ULS) for solar cosmic rays (SCR) (Miroshnichenko, 1994, 1996). It allowed us to revise and confirm our previous semi-empirical ideas on the true form of SEP energy spectra at the Earths orbit. In a limited energy range the SEP spectra may be approximately described by double power-law functions separated by a knee. A position of the knee (break-point) in the individual events, however, may be dependent of particle energy and SEP event size (e.g., Mewaldt et al., 2009). Combination with the ULS enables us to develop a new approach to the worst-case concept, and Carrington event (CE) provides a crucial normalization point for this goal. Such a prospect seems to be very promising for modeling and calculations of radiation doses. On the other hand, we have obtained a number of physical and methodical limitations that are important for the estimations and predictions of radiation hazardous SCR fluxes.

Wednesday, 3. Sep.
12:45-13:00, HGH
S1-379
Real-time data of muon hodoscope URAGAN
[1], [1,2,3]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), 115409, Moscow, R, [2]Dipartimento di Fisica dell' Universita di Torino et INFN, 10125 Torino, Italy, [3]Istituto di Fisica dello Spazio Interplanetario - INAF, 10133 Torino, Italy
Muon hodoscope URAGAN which consists of four independent supermodules with total area 45 sq. m began to operate in full configuration in 2007. At present, the sequence of real-time data for each hour and also the results of their analysis: local angular anisotropy, wavelet frequencies, etc. are available at URAGAN web-site. In this talk, some peculiarities of application of these data for the analysis of various events in heliosphere, magnetosphere and atmosphere will be presented.

Wednesday, 3. Sep.
15:45-16:00, HGH
S1-419
Annual variation of cosmic rays in 24th solar cycle
[1], [2], [2]
[1]Polar Geophysical Institute of RAS, Apatity, Russia, [2]Pushkov institute of terrestrial magnetism, ionosphere and radio wave propagation (IZMIRAN)
Analysis of data of world network neutron monitor (NM) has revealed the considerable annual variation of cosmic ray (CR) flux in 2011-2013. The variation observed at all stations: circumpolar, mid-latitude and subequatorial. It is present in the CR density changes obtained by the global survey. Annual variation is observed from 2011 to 2013. Phase variation is the same for all NM with a maximum in December - January and a minimum in June-July. Amplitude of a variation makes more than 1 percent. Variation absent all preceding years up to the seventies, where analysis also showed an annual variation in the period 1973-76. It is shown that in the same period of 2011-13 the quasi-annual variations of the interplanetary magnetic field (module IMF), the other parameters of the interplanetary medium (the speed, dynamic pressure solar wind) and the parameters of the solar magnetic field are observed. These variations are in good agreement with the identified CR variations. As the two possible causes are assumed: the features solar activity or asymmetry of a heliosphere.

Wednesday, 3. Sep.
16:30-16:45, HGH
S1-436
Long-term observations of cosmic rays in the Earths atmosphere
[1], [1], [1], [1], [1], [1], [1]
[1]Lebedev Physical Institute, Russian Academy of Sciences
Data on the charged particle fluxes as observed in the Earths northern and southern polar atmosphere as well as in the northern mid-latitude atmosphere are presented. Regular measurements of the secondary cosmic ray fluxes at the northern polar and mid-latitudes are being fulfilled since July 1957 up to present. Similar measurements at the southern polar latitude (Antarctica, Mirny station) are being fulfilled since March 1963 up to present. The atmosphere from the ground level up to the altitude of 35 km was divided into 51 intervals of the atmospheric pressure. Thus we have unique long-term homogeneous data sets on cosmic ray fluxes at various atmospheric levels. The available data cover more than five 11-year cycles of solar activity from July 1957, i.e. the middle of the 19th solar cycle, till August 2014, i.e. the middle of the 24th solar cycle. Comparison of the cosmic ray modulation effects in the above mentioned cycles is made. It is shown that cosmic rays play the main role in the Earths atmospheric electricity processes. A possible influence of variability of cosmic ray fluxes on the global climate change is analyzed.

Wednesday, 3. Sep.
16:45-17:00, HGH
S1-445
Estimations of cosmic ray drift fluxes in galactic cosmic rays
[1], [1], [2]
[1]Moscow institute of Physics and Technics, [2]Lebedev Physical Institute of the Russian Academy of Sciences
The analysis of relationship between cosmic ray fluxes observed in the atmosphere and solar activity was performed. The sunspot monthly numbers were used as a solar activity index. Comparison of cosmic ray fluxes measured in positive and negative phases of 22-year solar magnetic cycles for the period of 1957 2014 was made. The measured cosmic ray fluxes were compared with each other in positive and negative phases for ascending and descending branches of solar activity. It allowed us to exclude the influence of heliolatitude distribution of sunspots on cosmic ray fluxes. The cosmic ray drift fluxes are shown not to exceed 10

Wednesday, 3. Sep.

12:30-12:45, HGH
S1-510
How severe can be solar particle events: Assessment from cosmogenic radionuclides in lunar rocks
[1], [2]
[1]University of Oulu, Finland, [2]Ioffe Physical-Technical Institute, St. Petersburg, Russia
The question on how severe and frequent can be solar energetic particle (SEP) events is of great importance for both practical and theoretical studies. The era of direct SEP measurement is only few decades and corresponds to the period of active Sun. However, the use of indirect proxy makes it possible to look behind the horizon. We assess of the occurrence probability of large SEP events, using measurements of cosmogenic radionuclides in terrestrial archives and lunar rocks. We present a occurrence probability distribution function of SEP events for three different timescales: space era for the past 60 years; estimates based on the terrestrial cosmogenic radionuclides ^{10}Be and ^{14}C for the multimillennial timescale; and cosmogenic radionuclides measured in lunar rocks on a timescale of up to 1 Myr. The data suggest a strong roll-over of the occurrence probability, so that SEP events with a proton fluence with energy > 30 MeV greater than 10^{11} (protons/cm^2/yr) are not expected on a Myr timescale.

Wednesday, 3. Sep.
11:45-12:00, MPH
S4-488
Confronting EPOS-LHC predictions for the muon content of high-energy EAS with the KASCADE-Grande measurements
[1], *
[1]Institute of Physics and Mathematics, Universidad Michoacana
KASCADE-Grande was an air-shower experiment designed to study cosmic rays between 10^{16} and 10^{18} eV. The instrument was located at the site of the Karlsruhe Institute of Technology, Germany at an altitude of 110 m a.s.l. and covered an area of $0.5\,km^2$. KASCADE-Grande consisted of several detector systems dedicated to measure different components of the EAS generated by the primary cosmic rays, i.e. the muon and the electron contents of air-showers, with high precision. By combined analyses of the measured EAS observables, the data collected by KASCADE-Grande can be used not only to study in detail the properties of cosmic rays but also to test the predictions of high-energy hadronic-interaction models. In this work, the EPOS-LHC hadronic-interaction model is tested. In particular, predictions of CORSIKA/EPOS-LHC for the muon densities and the muon-number attenuation length in the atmosphere are confronted with the measurements of the KASCADE-Grande experiment at energies from $\approx 10^{16}$ to 10^{17} eV.

Wednesday, 3. Sep.
11:15-11:30, MPH
S5-277
Physics Goals and Status of JEM-EUSO and its Test Experiments
[1], [1]
[1]Karlsruhe Institute of Technology KIT, Germany
The JEM-EUSO mission aims to explore the origin of the extreme energy cosmic rays (EECRs) through the observation of air-shower fluorescence light from space. The super-wide-field telescope looks down from the International Space Station onto the night sky to detect UV photons (fluorescence and Cherenkov photons) emitted from air showers. Such a space detector offers the remarkable opportunity to observe a huge volume of atmosphere at once and will achieve an unprecedented statistics within a few years of operation. Several test experiments are currently in operation: one to observe the fluorescence background from the edge of the Atmosphere (EUSO-Balloon), and another to demonstrate on ground the capability of detecting air showers with a EUSO-type telescope (EUSO-TA). In this talk a review on the scientific objectives of the mission and an update of the instrument definition, performances and status, as well as status of the test experiments will be given.

Wednesday, 3. Sep.

11:30-11:45, MPH
S5-367
Results from the LHCf experiment
[1,2],
[1]INFN Section of Florence, Italy, [2]University of Florence, Department of Physics and Astronomy, Italy
LHCf is an experiment designed to study the very-forward emission of neutral particles (mainly photons, neutral pions and neutrons) produced in proton-proton and proton-nucleus collisions at the LHC. The experiment has successfully completed its data taking in p-p interactions at $\sqrt{s} = 0.9$ TeV, 2.76 TeV and 7 TeV and in p-Pb interactions at $\sqrt{s_{NN}} = 5.02$ TeV (energy of a couple of projectile and target nucleons in their center of mass reference frame), and it is being upgraded in order to complete its physics program at LHC during the forthcoming$\sqrt{s} = 13$ TeV p-p run. This set of measurements will represent an useful contribution to the calibration and tuning of the hadronic interaction models used for the simulation of atmospheric showers induced by very-high energy cosmic rays. The published results and the current status of the experiment will be reported.

Wednesday, 3. Sep.
12:30-12:45, MPH
S5-456
The Tunka Radio Extension: latest analysis results
[1]
[1]Karlsruhe Institute of Technology
Tunka-133 is an air-Cherenkov array placed in Siberia, near the southern tip of Lake Baikal, which registers air showers induced by cosmic rays from initial particles with energies of 10^{16}–10^{18} eV. After some years of successful data collection, this array was extended by other experiments. One of them is the Tunka Radio Extension (Tunka-Rex): the radio array consists of 25 antenna stations connected to the data acquisition of Tunka-133. This combination provides the possibility of hybrid measurements and cross-calibration between the air-Cherenkov and radio techniques. The main goal of Tunka-Rex is to determine the precision of the reconstruction of air-shower parameters using the radio detection technique. We present the latest results on the event reconstruction and compare obtained results with theoretical predictions.

Wednesday, 3. Sep.
12:00-12:15, MPH
S5-462
The average longitudinal shower profile: exploring the shape information
[1], [1], [1], [1,2]
[1]LIP - Laboratorio de Instrumentacao e Fisica Experimental de Particulas, [2]IST - Instituto Superior Tecnico
It is known that the shape of the extensive air shower (EAS) longitudinal profile contains information about the nature of the primary cosmic ray. However, with the current detection capabilities, the assessment of this quantity in a event-by-event basis is still very challenging. In this work we show that the average longitudinal profile can be used to characterise the average behaviour of high energy cosmic rays. Using the concept of universal shower profile it is possible to describe the shape of the average profile in terms of two variables, which can be already measured by the current experiments. These variables present sensitivity to both average primary mass composition and to hadronic interaction properties in shower development. The combination of the two shape variables provides a new powerful test to the existing hadronic interaction models, and may also provide important hints about multi-particle production at the highest energies.

Wednesday, 3. Sep.
12:15-12:30, MPH
S5-473
A description of the fluorescence emission in air induced by extensive air showers
[1], [2], [3], [4]

[1]Karlsruhe Institute of Technology KIT, Karlsruhe, Germany, [2]LIP-Coimbra and Departmamento de Fisica, Universidade de Coimbra, Portugal, [3]University of Tokyo, Japan, [4]Technische Universität München, Germany
For detecting ultra-high energy cosmic rays, the fluorescence technique is often used. This technique exploits that extensive air showers induce a fluorescence emission by nitrogen molecules while propagating through the Earths atmosphere. The light emission in the wavelengths range between about 290 and 430 nm is proportional to the amount of energy deposited by the air shower. Using a fully altitude- and atmosphere-dependent description of the fluorescence emission in air shower reconstructions provides a strong tool for determining the primary energy and particle of extensive air showers. Here, we want to present a description of the fluorescence emission applicable for air shower reconstruction. Many data from laboratory experiments for different dependences of the light emission are used to derive a full set of parameters for considering the variety of atmospheric conditions and the spectral dependences.

Wednesday, 3. Sep.
15:45-16:00, MPH
S6-1000
Indirect Search for Dark Matter with the ANTARES Neutrino Telescope
[1]

[1]Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Department Physik
The ANTARES neutrino telescope, which has been taking data since 2006 and was completed in 2008, is currently the largest neutrino detector in the Northern Hemisphere. The detection principle is based on the observation of Cherenkov light emitted by muons resulting from charged-current interactions of muon neutrinos in the vicinity of the detection volume. ANTARES has a broad scientific scope, one of the main scientific goals is the indirect detection of dark matter. Good dark matter candidates are provided by Supersymmetry (neutralinos) and models with universal extra dimensions (Kaluza-Klein particles). These WIMPS could accumulate in massive astronomical objects like the Sun, the Earth or the Galactic Centre. Thus, it is possible to search indirectly for dark matter by looking for an excess neutrino flux from these astronomical objects, produced by the annihilation products of WIMP pair-annihilation. In this talk, the results and sensitivities of the ANTARES dark matter searches will be presented.

Wednesday, 3. Sep.
14:30-14:45, MPH
S6-184
Interpretations of the IceCube excess
[1]

[1]NTNU
The IceCube Collaboration announced last year evidence for the first detection of extraterrestrial neutrinos, finding excess events in the 60 TeV to 2 PeV energy range corresponding to a diffuse intensity close to the cascade bound. I review the neutrino yield from collisions of cosmic ray (CR) nuclei on gas and discuss the possibility that Galactic sources can explain the IceCube excess. Then I recall the cascade bound on extragalactic neutrino sources which constrains extragalactic sources as explanation the IceCube excess. Finally, PeV dark matter is constrained by the angular distribution of the neutrino events as well as limits on the photon flux.

Wednesday, 3. Sep.
14:45, MPH
S6-186
Searches for Point-like sources using the ANTARES neutrino Telescope
[1],

[1]IFIC (CSIC - Universitat de Valencia)
A search for cosmic neutrino sources using six years of data collected by the ANTARES neutrino telescope has been performed.

Clusters of muon neutrinos over the expected atmospheric background have been looked for. No signal has been found. The most signal-like accumulation of events is located at equatorial coordinates RA=-46.8° and Dec =-64.9° and corresponds to a 2.2σ background fluctuation. In addition, upper limits on the flux normalization of an E^{-2} muon neutrino energy spectrum have been set for 50 pre-selected astrophysical objects. Finally, motivated by an accumulation of 7 events relatively close to the Galactic Centre in the recently reported neutrino sample of the IceCube telescope, a search for point sources in a region around this accumulation has been carried out. No indication of a neutrino signal has been found in the ANTARES data and upper limits on the flux normalization of neutrinos in that region have been set.

Wednesday, 3. Sep.
15:00-15-15, MPH
S6-241
Diffuse flux results from the Antares neutrino telescope
[1]
[1]Antares
The Antares neutrino telescope is located in the Mediterranean Sea off the coast of France and offers a high visibility of the Galactic plane. Its main scientific goal is the detection of cosmic neutrinos, which is achieved by measuring the Cherenkov light emitted by the products of neutrino interactions. A limit on the all-sky diffuse neutrino flux has been set using muon-neutrinos, and a new analysis provides an improved sensitivity by also using showers created in electron- and tau-neutrino interactions. In addition, the high visibility of the Galactic plane is exploited in a dedicated analysis focussing on the Galactic plane. In this analysis the diffuse muon-neutrino flux of a region around the Galactic plane is compared with the flux from multiple equivalent off-source regions. Results of these analyses using five years of data will be presented.

Wednesday, 3. Sep.
15:15-15:30, MPH
S6-420
Investigation of cascade showers in Cherenkov water detector NEVOD
[1], [1,2,3]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), [2]Dipartimento di Fisica dell Universita di Torino et INFN, [3]Istituto di Fisica dello Spazio Interplanetario INAF
The technique of cascade energy measurements by means of Cherenkov water detector NEVOD (2000 cubic meters volume) is discussed. Cascades were generated in water by nearly horizontal muons with mean energy about 100 GeV selected by means of the coordinate detector DECOR with the total sensitive area 70 square meters and high spatial (1 cm) and angular (better than 1 degree) accuracies. The detecting system of NEVOD is formed by a dense spatial lattice of quasi-spherical optical modules (91 in total). Such system allows to reconstruct the transition curves in Cherenkov light in individual events. Results of cascade energy spectrum measurements during experimental exposition Dec 2011 Mar 2013 are presented. Data are compared with simulation results and with magnetic spectrometer measurements in overlapped energy and zenith angle ranges.

Wednesday, 3. Sep.
15:30-15:45, MPH
S6-442
Measurement of the Muon Neutrino Spectrum with IceCube
[1], [1]
[1]TU Dortmund
IceCube is as neutrino telescope deposited in the glacial ice at the geographic south pole with an instrumented volume of one cubic kilometer. We will present preliminary results on the energy unfolding of muon neutrinos with the IceCube Neutrino Observatory in its 79 string configuration. For the unfolding we derived a sample of high quality muon neutrinos with a purity above 99.2% using a random forest. The unfolding was performed using a second derivative Tikhonov regularization within the software TRUEE. The

unfolding covers an energy range of more than 4 decades starting at 125 GeV and ending at 3.2 PeV. Furthermore we will show that the obtained result is compatible to the recent IceCube discovery of an extra terrestrial neutrino flux.

Wednesday, 3. Sep.
12:45-13:00, MPH
S7-417
The cascade model of the VHE anomaly in AGN spectra
[1]

[1]Skobeltsyn Institute of Nuclear Physics Lomonosov Moscow State University
The last decade marked a great increase of the number of observed gamma-loud Active Galactic Nuclei (AGN) by ground-based gamma-ray detectors up to redshift z≈0.5. One might expect that absorption of the primary Very High Energy (VHE) photons on Extragalactic Background Light (EBL) would produce a marked cutoff in the observed spectrum, which is not observed, thus giving rise to the VHE anomaly in AGN spectra, often called the pair-production anomaly. Most of research done on the subject neglected the secondary photons emitted from the electromagnetic cascades that may contribute to the observed flux. In the present work, for the first time, a quantitative study of the cascade explanation of the VHE anomaly is performed with modern statistical methods. It is shown that cascade photons may be partly responsible for the VHE anomaly under reasonable assumptions on the primary spectrum of the source, EBL model, and extragalactic magnetic field (EGMF) model.

Wednesday, 3. Sep.
16:30-16:45, MPH
S7-460
A limit on the diffuse gamma-ray flux measured with KASCADE-Grande
[1], [2]

[1]Karlsruhe Institute of Technology, [2]www-ik.fzk.de/KASCADE_home.html
Using data measured by the KASCADE-Grande air-shower array, an upper limit for the flux of ultra-high energy gamma rays in the primary cosmic ray flux is determined. The KASCADE-Grande experiment measures the electromagnetic and muonic components for individual air showers in the energy range of 10 PeV up to 1 EeV. The analysis is performed by selecting air showers with low muon content. A preliminary result on the 90% C.L. upper limit to the relative intensity of gamma-rays with respect to cosmic ray primaries will be presented and discussed with limits reported in previous measurements.

Wednesday, 3. Sep.
16:45-17:00, MPH
S8-228
Tragaldabas: a new high resolution detector for the regular study of Cosmic Rays
[1,2]

[1]LabCAF, Univ. Santiago de Compostela, Spain, [2]on behalf of the Tragaldabas collaboration
Primary cosmic rays are permanently showering the Earth coming either from the Sun, our galaxy or the Universe. In the proximities of the Earth, they may be significantly affected by the interplanetary magnetic field and the atmosphere, together with other effects. As a consequence, the continuous and systematic study of the cosmic rays detected at the Earth surface is a very valuable source of information both of our Earth and our near space.

In order to study many of these phenomena, a new RPC-based cosmic ray detector, TRAGALDABAS (acronym of "TRAsGo for the AnaLysis of the nuclear matter Decay, the Atmosphere, the earth's B-field And the Solar activity) has been recently installed at the Univ. of Santiago de Compostela, Spain. The detector consists on two 1.8 m2 planes of two 1mm-gap glass RPCs. Each plane is read-out with 120 pads. The main performances of the detectors are: an arrival time resolution of about 300 ps, a tracking angular resolution below 3, a detection efficiency close to 1, and a solid angle acceptance of 5 srad. Another two planes of RPC detectors will be added in the next future in order to improve both the resolutions and the acceptance.

The detector has been acquiring test data since last September with a rate of about 80 events/s. Regular continuous data

taking has been started recently. A team of about 20 researchers from 11 laboratories of 5 European countries will be in charge of the maintenance and calibration of this infrastructure and the storage and analysis of the data.

The main design features of the facility will be presented together with the preliminary results of the performances of the detector and a summary of the main fields of research to be undertaken in the next future, that cover: general properties of cosmic ray showers, solar physics, space weather, geomagnetism, and stratosphere dynamics, among others.

Wednesday, 3. Sep.
17:00-17:15, MPH
S8-278

The KASCADE Cosmic-ray Data Centre KCDC

[1], [1], [1], [1], [1], [1], [1]
[1]Karlsruhe Institute of Technology KIT, Germany

KCDC, the KASCADE Cosmic ray Data Centre, is a web portal, where astroparticle physics research data are presented to the public in open access. The KASCADE experiment, financed by public money, was a large-area detector for the measurement of high-energy cosmic rays via the detection of air showers. KASCADE and its extension KASCADE-Grande stopped finally the active data acquisition of all its components including LOPES end of 2012 after more than 20 years of data taking. In a first release, with KCDC we provide to the public the measured and reconstructed parameters of more than 160 million air showers. In addition, KCDC provides the conceptional design, how the data can be treated and processed so that they are reasonably usable outside the community of experts in the research field. Detailed educational examples make a use also possible for high-school students and early stage researchers.

Wednesday, 3. Sep.
09:00-09:30, MPH
S8-279

Air shower observations from space with TUS/JEM-EUSO/KLYPVE

[1]
[1]Skobeltsyn Institute of Nuclear Physics Lomonosov Moscow State University
On behalf of the TUS, KLYPVE and JEM-EUSO collaborations.

Two types of orbital Ultra High Energy Cosmic Ray (UHECR) detectors are being developed nowadays: (i) TUS and KLYPVE with reflecting optical systems (mirrors) and (ii) JEM-EUSO with high-transmittance Fresnel lenses. They will cover much larger areas than existing ground-based arrays and will uniformly monitor the celestial sphere. The TUS detector is the pioneering mission developed in SINP MSU in cooperation with several Russian and foreign institutions. It has relatively small field of view ($\pm 4.5^\circ$), which corresponds to ground area $6.4 \cdot 10^3$ km^2. The detector contains a Fresnel-type mirror-concentrator (~ 2 m^2) and a photo receiver (matrix of 16×16 photomultiplier tubes). It is to be deployed on the Lomonosov satellite, and is currently at the final stage of preflight tests. Recently SINP MSU began the KLYPVE project to be installed on board of the Russian segment of the ISS. The optical system of this detector contains a larger primary mirror (10 m^2), which allows decreasing the energy threshold. The total effective field of view will be at least $\pm 14^\circ$ to exceed the annual exposure of the existing ground-based experiments. Several configurations of the detector are being currently considered. JEM-EUSO is a wide field of view ($\pm 30^\circ$) detector. The optics is composed of two curved double-sided Fresnel lenses with 2.65 m external diameter, a precision middle lens and a pupil. The UV photons are focused onto the focal surface, which consists of nearly 5000 multi-anode photomultipliers. It is developed by a large international collaboration. All three orbital detectors have multi-purpose character due to continuous monitoring of various atmospheric phenomena. The present status of development of the TUS, KLYPVE and JEM-EUSO missions is reported.

Wednesday, 3. Sep.
17:30-17:45, MPH
S8-313

Results of LOPES on the Radio Detection of Air Showers

[1], [2]

[1]Institut für Kernphysik, Karlsruhe Institute of Technology (KIT), Germany, [2]www.lopes-project.org

LOPES was a digital antenna array operating for more than 10 years. Triggered by the co-located KASCADE-Grande experiment, it measured the radio signal of more than 1000 cosmic ray air showers with an energy around and above 10^{17} eV. Although the data acquisition has stopped, the analysis still continues. We will show the latest results on the measurements of inclined air showers with vertical antennas, and the comparison of simulations with our measurements now including a full detector simulation. A special focus will be given on the reconstruction of shower parameters, in particular the position of the shower maximum. For this purpose, two different properties of the radio signal are used: the slope of the lateral distribution of the radio amplitude and the steepness of the hyperbolic radio wave front. Although the precision of LOPES is limited due to the high industrial background, the results provide important input for current antenna arrays in radio-quiet areas.

Wednesday, 3. Sep.
17:30-17:45, MPH
S8-315

A multi-telescope magnetic facility in space with large acceptance and high MDR

[0], [1]

[1]INFN and University, Firenze, Italy, [2]INFN and University, Firenze, Italy

The facility is constituted by a cubic homogeneous isotropic deep calorimeter equipped by magnetic field on 4 of its faces. 4 coils at 4 edges of the cube constitute a null dipole magnetic torus wrapping the cube, suitable to operate in space. 4 detector telescopes can be lodged between each couple of coils, the fifth face of the cube left free for a not magnetic telescope, and the six face used for the mechanical support, the electronics and services. To take full advantage of the cubic shape of the calorimeter the facility should be operated in a high orbit, possibly outside the terrestrial magnetic field. With the cubic calorimeter composed as a 3D matrix of CsI small crystals the facility could have GF about 5m2sr and measure spectra of positrons and antiprotons up to several TeV, of electrons up to ¿10TeV, of protons up to 3 PeV, and ions fluxes up to actinides. The main parameters of the calorimeter, of the coil system and of the detector telescopes are evaluated and discussed.

Wednesday, 3. Sep.
17:45-18;00, MPH
S8-362

Close cathode chamber technology for cosmic particle tracking

[1], [1], [1], [1], [2], [1]

[1]Wigner Research Centre for Physics of the Hungarian Academy of Sciences, [2]Geological, Geophysical and Space Science Research Group of the Hungarian Academy of Sciences

The close cathode chamber (CCC) technology [1] has been developed and found useful in a portable tracking system under harsh and varying environmental conditions due to their mechanical and operational stability [2]. The muon flux have been measured on ground and at shallow depths underground (< 70 m.r.e) which provides a good reference for other experiments. The multiple scattering in rock and the soft contamination of the track sample have been investigated by experimentally and GEANT4. The applicability of the sensor to detect underground rock density inhomogeneities has been demonstrated via reconstruction of an underground tunnel system. A muon tomograph has been built with sensitive area of 0.25 m^2 and angular resolution of few mrad. It is useful for material discrimination via the measurement of multiple scattering and absorption of muons. The reliable tracking performance, low power consumption and fair angular resolution make useful the CCC technology also in large area tracking detectors.

[1] D. Varga et al.: NIM A698 (2013) 11-18 [2] G. G. Barnafldi et al.: NIM A689 (2012) 60-69

Wednesday, 3. Sep.
09:55-10:20, MPH

S8-465

Solar Orbiter and its energetic particle instrumentation: EPD

[1], [2]

[1]Space Research Group, University of Alcala, [2]Institut fuer Experimentelle und Angewandte Physik, University of Kiel

Solar Orbiter is the first mission of ESA's Cosmic Vision program. It will be launched in 2017. Once in its nominal orbit, it will approach the Sun as close as 0.28 AU. Its scientific instrumentation can be divided into two groups: remote sensing and in situ. Within the latter category, the Energetic Particle Detector (EPD) will be responsible for providing data on solar energetic particles (SEP). We will present the mission instrumentation, its scientific highlights and then describe EPD and its science.

Wednesday, 3. Sep.
09:30-09:55, MPH
S8-482

Towards gamma-ray astronomy with timing-arrays

[1]

[1]Universität Hamburg

An effective search for the most energetic Galactic cosmic ray accelerators requires surveys of a large part of the sky and observations beyond 10 TeV primary gamma-ray energy. Today, the energy spectra of most known gamma-ray emitters only reach up to few 10s of TeV, with 80 TeV from the Crab Nebula being the highest energy so far observed significantly. Sensitive spectroscopic observations in this energy range and beyond require very large effective detector areas of the order of few square-km or more. While imaging air Cherenkov telescopes have proven to be the instruments of choice in the GeV to TeV energy range, very large area telescope arrays are limited by the number of required readout channels per square-km. Alternatively, the shower-front sampling technique allows to instrument large effective areas and also naturally provides large viewing angles of the instrument. Solely measuring the shower front light density and timing (hence timing-arrays), the primary particle properties are reconstructed on the basis of the measured lateral density function and the shower front arrival times. This presentation gives an overview of the technique, its goals, and future perspective.

Wednesday, 3. Sep.
10:20-10:45, MPH
S8-544

JUICE: Europe's mission to Jupiter

[1]

[1]Max-Planck-Institut fr Sonnensystemforschung MPS, 37077 Gttingen, Germany

The Jupiter Icy Moon Explorer JUICE will be the first spacecraft orbiting a moon in our solar system. The science targets of the mission Will be the moons Ganymede, Callisto, and Europa as well as the atmosphere and the magnetosphere of the planet. JUICE will investigate the Jovian magnetosphere early in the mission combined with two close flybys at Europa and 8 flybys at Callisto. For the first time the high latitude magnetosphere up to 30 degrees will be studied in detail for an extended period of time. The main focus of the mission, however, is the investigation of the moon Ganymede. In three different phases different topics of Ganymede Research will be performed. Ganymede's magnetosphere and its boundaries will be investigated in an elliptic orbital phase while its surface and Its underneath subsurface ocean will be studied in circular orbital phases at different altitudes. The science payload consists of in-situ and remote sensing instrumentation with the newest technologies onboard. Launch is planned for 2022 and the arrival at Jupiter is foreseen for 2030. Mission duration in the Jovian system is three years minimum.

week
0:0, Test
S1-124

CaLMa Neutron Monitor: current status and future improvements

[1,2], [1,2], [1,2], [1], [1,2], [2], [3]

[1]SRG-UAH, [2]CaLMa-Guadalab, [3]UAH
Castilla-La Mancha Neutron Monitor (CaLMa) is a neutron monitor integrated by 15 boron trifluoride counters located in Guadalajara, Spain ($40°38'N$, $3°9'W$) at 708 m asl. With a vertical rigidity cutoff of 6.95 GV is able to measure neutrons produced by primary cosmic rays with energies above 6 GeV/nucleon. CaLMa is monitoring the solar activity since October 2011 continuously, reporting more than 15 Forbush decreases. This work presents the preliminary results inferred from CaLMa count rate variations, shows the last improvements in CaLMa and our future plans to improve the station

week
0:0, MPH
S1-125
nmPanel: a tool for controlling Neutron Monitor operation and maintenance
[1,2], [2], [1,2], [1,2], [1,2]
[1]SRG-UAH, [2]CaLMa-Guadalab
As a complement to the current data acquisition system running in CaLMa, a new software to control the station operation has been developed. The goal of this software is to assist the operator in data quality assurance, diagnose operational problems and to perform maintenance operations. The user interface has been built as a web application so it can used with a modern web browser, while server side has been designed to operate as a RESTfull server. This will enable new applications to talk to the station to retrieve data or give operational commands. The application provides a tool to identify anomalies in data and allows the operator to trace its origin, and since the application is NMDB-aware, it also features automatic uploading of revisited data to the network.

week
0:0, MPH
S1-126
CaLMa simultaneous Muon Telescope and Neutron Monitor proposal
[1,2], [1,2], [1,2], [1,2]
[1]SRG-UAH, [2]CaLMa-Guadalab
There is already work in progress for the construction of a muon telescope in the same facilities as the Castilla-La Mancha Neutron Monitor (CaLMa) in Guadalajara, Spain, in order to use both instruments simultaneosuly to measure neutrons and muons produced by primary cosmic rays at the same physical location, and to analyze the possible correlation between both measurements. The muon telescope will be built using eight detectors in a two-layer 2x2 matrix for directionality analysis, and using the neutron monitor's lead shielding as moderator material in order to perform coincidence and anti-coicidence measurements. This work presents the proposed muon telescope physical configuration, data acquisition system local architecture (hardware and software) and the long-term data storage and publication, as well as the projected muon detection capabilities that this system should be be able to perform.

week
0:0, MPH
S1-176
Possible ground level enhancements at the beginning of the maximum of Solar Cycle 24
[1], [2], [2], [1], [1], [1], [2]
[1]Institute of Ionosphere, Almaty, Kazakhstan, [2]Pushkov Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation (IZMIRAN), Moscow,
It is considered that up to this date in the 24 solar cycle it was registered two ground level enhancements of solar cosmic rays (GLEs): May 17, 2012 and January 6, 2014. The current solar activity cycle is inferior to previous cycles in quantity and magnitude of GLEs. It were significantly more (about 30) solar proton events recorded by the satellites. We decided to analyze the behavior of the cosmic ray intensity at the worldwide neutron monitor network in the events of 2012, when there was a significant increase of the integral proton flux with energies ¿ 100 MeV, namely in the events of January 27 , March 7 and March 13, 2012. All these

events can be considered as candidates for the ground level enhancements of solar cosmic rays. It seems, in the 24 solar cycle it has been observed more GLEs, than widely recognized.

week
0:0, MPH
S1-208
Tensor anisotropy of cosmic rays
[1], [1], [1], [1]
[1]Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS
Long-term observations of the muon intensity of cosmic rays at the Nagoya and Yakutsk stations and also the observations of neutron monitor world network have revealed amplitude-phase oscillations of the semidiurnal variation during a year and also oscillations of antisymmetric diurnal variation. These effects reflect properties of a tensor anisotropy which are determined in this work with simple geometric models. The north-south asymmetry in the behaviour of anisotropy tensor is found.

week
0:0, MPH
S1-214
Ground level enhancements and their solar counterpart
[1,2], [1,2,3], [1,2,3], [1,2,3], [1,2,3], [1,2,3]
[1]SRG-UAH, [2]CaLMa-Guadalab, [3]UAH
Neutron monitors are particle detectors sensitive to Cosmic Rays in the range of hundreds of MeV to 20 GeV. Solar activity phenomena like solar flares and coronal mass ejections are often accompanied by particle acceleration, producing solar energetic particle (SEP) events. However, only the most intense and energetic SEP events are able to produce significant ground level enhancements (GLEs). This work analyzes the solar source of GLEs, the propagation conditions of the associated SEPs to those GLEs and their impact on the Earth environment, during the last two solar cycles, using data from the Neutron Monitor Database (NMDB) and the Solar and Heliospheric Observatory (SOHO).

week
0:0, MPH
S1-253
Phase distribution of the first harmonic of the cosmic ray anisotropy during the initial phase of Forbush effects
[1], [1], [1], [1], [1], [1]
[1]IZMIRAN
Phase distribution and amplitude-phase dependence of the first harmonic of the cosmic ray anisotropy during the initial phase of Forbush effects are studied. Statistical analysis of all Forbush effects with sudden onset during 1957-2012 showed that the main features of phase distribution of the first harmonic of the cosmic ray anisotropy persist throughout the main phase of the Forbush effects, starting from the hour before the shock wave until the hour with the maximal amplitude of anisotropy. Amplitude of vector anisotropy is higher already before the arrival of the shock wave than in quiet periods, and it gradually increases as Earth enters deeper the interplanetary disturbance which creates the Forbush decrease.

week
0:0, MPH
S1-281
Modulation of Jovian MeV-electrons by Coroating Interaction Regions
[1], [2], [1], [2], [1,2], [3], [4], [2]
[1]IEAP, Universtitt Kiel, [2]Ruhr-Universitt Bochum, [3]North-West University Potchefstroom, [4]MINT-Kolleg Baden-Wrttemberg

Corotating Interaction Regions (CIRs) are recurrent structures in the solar wind characterized by a velocity jump and a magnetic field compression. Since the 1970s it is known that Jupiter is a quasi-continuous source of MeV-electrons dominating the flux in the inner heliosphere. In connection with CIRs, this flux is modulated mainly by changing propagation conditions in the inner heliosphere. In order to model these recurrent variations in Jovian electron intensity the VLUGR3-Code was used to solve Parkers Transport Equation. The diffusion coefficients as well as the solar wind speed are modelled from 0.1 to 50 AU. Two different approaches were used, one derived by Kissmann [2002] and another by Giacalone et al. [2002] which was further developed. The simulation results are compared to IMP-8 electron count rates to investigate the differences of the two solar wind description models in the propagation code, which show an improved description of the time profil by the new Giacalone model.

week
0:0, MPH
S1-306
Periodic variations of Jovian electron fluxes at SOHO and STEREO
[1], [2], [3], [2]
[1]Wigner Research Centre for Physics, Budapest, Hungary, [2]Skobeltsyn Institute of Nuclear Physics, MSU, Moscow, Russia, [3]Institute of Experimental Physics, Kosice, Slovakia
During the solar activity minimum of 2007-08 a series of 14 successive enhancements of Jovian MeV electron fluxes was observed aboard SOHO, characterized by period of variations about 26 days, shorter than the synodic period of the system Sun-Earth (27.3 days). This raises a number of questions about the reasons of such a discrepancy. Jovian electrons were registered simultaneously aboard STEREO A and B with synodic periods slightly different from that at the Earth. The periodic enhancements observed in 2009 are also analyzed and compared. Although the high background of STEREO HET data encumbers the analysis of periods of variations, periodic analysis (wavelet, Lomb) of variations of Jupiter electron fluxes at all three apparatusses was performed by the same methodology. The expected differences of periods of variations for STEREO A, SOHO and STEREO B are discussed.

week
0:0, MPH
S1-307
Quiet-time suprathermal ion abundances in slow and fast solar wind
[1], [2], [2]
[1]Wigner Research Centre for Physics, Budapest, Hungary, [2]Skobeltsyn Institute of Nuclear Physics, MSU, Moscow, Russia
The energy spectra and relative abundances of 0.08-1 MeV/n 4He, C, O and Fe ions are investigated at 1 AU using ACE/ULEIS data as a function of solar wind speed during quiet-time periods in 2006-2012. The unique prolonged solar activity minimum between 23rd and 24th SC allowed selecting suprathermal ion fluxes from near equatorial coronal holes. The values of suprathermal C/O and Fe/O from coronal holes at solar activity minimum and maximum are found to correlate with bulk solar wind values C/O and Fe/O. This suggests that the bulk solar wind appears to be the source of ions further accelerated forming the high energy tail. In contrast, the 4He/O ratio in suprathermal fluxes exceeded bulk solar wind values by more than an order of magnitude both in the slow and fast solar wind indicating additional sources of suprathermal 4He. Ion energy spectra change with solar activity and depend on solar wind speed showing that ion intensities are higher in fast wind from coronal holes.

week
0:0, MPH
S1-345
Cosmic ray intensity for about five solar cycles
[1], [1], [1], [1], [1], [2]
[1]IAPS/INAF, Via del Fosso del cavaliere 100, 00133, Roma, Italy , [2]Dipartimento di Matematica e Fisica, Universit degli Studi Roma Tre, Via della Vasca Navale 84, 001
Since the International Geophysical Year (1957-1958) the continuous records of the cosmic-ray nucleonic component have been

achieved at SVIRCO Observatory in Rome by different types and location of neutron monitors (first at La Sapienza University: 41.90 N, 12.52 E, altitude about 60 m a.s.l., and then at Roma Tre University: 41.86N, 12.47E, height about sea level). The normalized data, covering the whole period from July 1957 to December 2013 are used to investigate the long-term cosmic ray (CR) behaviour at a rigidity threshold of about 6 GV. Results, derived from a detailed analysis performed by using the Descriptive Statistics Technique, are compared with past findings and discussed in the context of variations in the heliospheric conditions.

week
0:0, MPH
S1-354

27-day variations of GCR intensity and anisotropy based on corrected and uncorrected for geomagnetic disturbances data of neutron monitors

[1], [1], [2], [3], [3]
[1]Institute of Math. And Physics of Siedlce University, Siedlce, Poland, [2]Institute of Computer Science of Siedlce University, Siedlce, Poland, [3]The Institute of Solar- Terrestrial Physics of Siberian Branch of RAS, P.O.Box 291, Irkutsk, Russia

We study 27-day variations of the galactic cosmic ray (GCR) intensity and anisotropy in solar cycle 23. We use various parameters of solar wind and solar activity, and neutron monitors data corrected and uncorrected for geomagnetic disturbances. There exist time intervals when the 27-day waviness of GCR intensity and anisotropy, and solar wind and solar activity parameters are (i) well established, (ii) recognizable 27-day variations are observed only in the GCR intensity, and interplanetary magnetic field (IMF) strength, and (iii) 27-day variations of anisotropy of GCR lasting longer than in the GCR intensity. One can state that there always exist some feeble 27 day variations in the GCR intensity and anisotropy related with weak heliolongitudinal asymmetry in heliosphere. We challenge to reveal 27-day variations of the GCR intensity caused by sector structure of the IMF.

week
0:0, MPH
S1-364

On the GCR intensity and SW and HMF characteristics in and outside the HMF sector structure zone

[1], [1], [1], [1], [1]
[1]Lebedev Physical Institute RAS

Using the Ulysses data on the solar wind (SW) and heliospheric magnetic field (HMF) for all three Ulysses turns around the Sun we compared these characteristics in and outside the HMF sector structure zone. Some regular difference probably depending on latitude and radial distance was observed both in the regular and fluctuating HMF components and in the SW velocity. Then using very simple model of the galactic cosmic ray (GCR) intensity modulation we consider how the above difference in the HMF distribution may influence the calculated GCR intensity in the heliosphere and compare the results of the calculations with the observations.

week
0:0, MPH
S1-372

Spatial topological structure of magnetic field lines creating during alpha-omega transformation in the quasi- periodic variations of galactic cosmic rays

[1], [1,2]
[1]Siedlce University, Poland, [2]Institute of Geophysics, Tbilisi State University, Georgia

Recently we established that amplitudes of the 27-day variations of the galactic cosmic ray intensity and various parameters of solar wind and solar activity show quasi- periodic changes with various periodicities, among them very clearly seen cycling with 3 to 4 Carrington rotation periods (3-4 CRP). We ascribe this phenomenon to the spatial topological structure of magnetic field lines creating by alpha-omega transformation with peculiarities for the each individual rotation of the Sun. Continuing to study this phenomenon we recognize that there are the quasi-periodicities with periods less than, and larger than 3-4 CRP. This finding

led us to a new assumption. We consider as unite of time interval not only one solar rotation period, but periods corresponding to the higher harmonics. We recognize that there also exist quasi-periodicities for these cases. Moreover, there are recognizable quasi-periodicities for much less unite time intervals- days and minutes. According to our analyses we conclude that any quasi-periodicities in changes of the GCR intensity are related to the join effects of the turbulent solar dynamo and differential rotation of the Sun.

week
0:0, MPH
S1-383

Local anisotropy of muon flux during FD according to URAGAN data

[1], [1,2,3]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), [2]Dipartimento di Fisica dell Universita di Torino et INFN, [3]Istituto di Fisica dello Spazio Interplanetario INAF

Muon hodoscope URAGAN operates in the Experimental complex NEVOD since 2006 and provides registration of muons in a wide range of zenith angles (from 0 to 80 degrees) with spatial and angular resolution of about 1 cm and 0.8 degree respectively. Hodoscope allows simultaneous recording of variations of the muon flux from different directions of celestial hemisphere. One supermodule of the hodoscope registers and records in two-dimensional angular matrix the arrival directions of about 80 thousand muons every minute. The analysis of such matrices allows to study zenith-angular and azimuthal dependences and anisotropy of the muon flux using the single setup. Features of zenith-azimuthal distribution of the muon flux for a certain time interval can be quantitatively described by the parameters of local anisotropy vector. The results of the analysis of various parameters that characterize variations of the local anisotropy of muon flux during FD are presented.

week
0:0, MPH
S1-393

Forbush decreases associated to Stealth CME

[1], [1], [1], [2], [2], [3], [3], [4]
[1]Christian-Albrechts-Universitaet zu Kiel, [2]Hvar Observatory, Faculty of Geodesy, Kaciceva 26, 10000 Zagreb, Croatia, [3]Institute of Physics, University of Graz, Graz, Austria, [4]Jeremiah Horrocks Institute, University of Central Lancashire, Preston, UK

Interplanetary coronal mass ejections (ICMEs) are structures in the solar wind that are the counterparts of coronal mass ejections (CMEs) at the Sun. It is commonly believed that enhanced magnetic fields in interplanetary shocks and solar ejecta as well as the increased solar wind speed are the cause of Forbush decreases (FDs) that are intensity decreases of galactic cosmic rays (GCRs) intensities. FDs have been extensively investigated by means of neutron monitor measurements. However, using neutron monitor measurements one has to keep in mind that its measurements not only reflect the GCR intensity variation in interplanetary space but also the variation of the geomagnetic field as well as the conditions in the Earth atmosphere. Albeit the very high counting statistic allowing to determine intensity variation of less than a percent the interplanetary signal may be masked by e.g. the daily variation or the change of the geomagnetic field. In contrast single detector measurements aboard a spacecraft in interplanetary space do not suffer from such variations. It has been shown previously that the counting rate statistic allows the determination of FDs with less than a few per mille. However, in contrast to neutron monitors such detectors are sensitive to a few tenth of MeV/n ions and therefore the investigation of FDs becomes impossible if the event is accompanied by accelerated particles. Here we will present observations by both Electron Proton Helium INstruments (EPHIN) aboard SOHO and Chandra as well as neutron monitor measurement that were associated to Stealth CMEs. We found for each of these events an associated FD. The amplitude in space varied between 0.6% and 3.5%. Only one of the events was identified in the neutron monitor data unambiguously.

week
0:0, MPH
S1-394

Multi–spacecraft observations of heavy–ion solar energetic particles

[1], [1]

[1]Jeremiah Horrocks Institute, University of Central Lancashire, Preston PR1 2HE, United Kingdom

Solar Energetic Particles (SEPs) released during flares and coronal mass ejections can be detected by spacecraft widely separated in longitude. The mechanism by which this transport across the magnetic field takes place remains unclear.

Studies of SEP events simultaneously detected by multiple spacecraft have mostly focussed on electron and proton data. Here, we consider multi–spacecraft events observed by the LET instrument on STEREO A and B, and by SIS on board ACE, located near Earth, and analyse the properties of heavy ion SEPs. We study the intensity time profiles and spectra, and the time variations of heavy ion ratios. We verify how these measurements depend on the relative location between the magnetic footpoint of the spacecraft and the associated solar eruptive events. We discuss how the results provide information on possible mechanisms for particle cross field transport, including drift processes.

week
0:0, MPH
S1-397

Maxwell induction equation and the 3-4 Carrington Rotation Period cycling of the 27-day variation of the galactic cosmic ray intensity

[1,2], [1]

[1]Siedlce University, Poland, [2]Tbilisi State University, Georgia

In our recent studies we found a cycling of 3-4 Carrington Rotation Period (3-4 CRP) of the amplitudes of the 27-day variations of the galactic cosmic ray intensity and various parameters of solar activity and solar wind. Not to find a better candidate for explanation of this phenomenon, we suggested an existence of a special topological magnetic lines structure on Sun created by cooperation of turbulent solar dynamo and differential rotation of Sun (alpha-omega effect). We consider extreme periods of differential rotation, 25-35 days from equator to poles. We assume that alpha-omega process appears in intermediate periods, too, e.g. 25-26, 25-27 and so on up to 25-35 days. We consider discrete numbers of differential rotations, understanding that it is very first approximation. Maxwell equation for hydrodynamic magnetized plasma is solved for different ranges of dissipation of magnetic flux (taking into account it via diffusivity coefficient of magnetic lines). We solve an induction equation for a case when a diffusivity coefficient is 0, but magnetic field topological structure has temporal peculiarities during each solar rotation period.

week
0:0, MPH
S1-399

27-day variation of the 3D anisotropy of cosmic rays: 1965-2013

[1], [1,2]

[1]Institute of Math. and Physics, Siedlce University, Siedlce, Poland, [2]Institute of Geophysics, Tbilisi State University, Tbilisi, Georgia

The temporal changes of the 27-day variation of the three dimensional (3D) galactic cosmic ray (GCR) anisotropy has been studied for 1965-2013. 3D anisotropy vector is used to study an existence of the north-south asymmetry of the heliosphere. We analyze the 27-day variation of the (i) two dimensional (2D) GCR anisotropy in the ecliptic plane and (ii) North-South anisotropy normal to the ecliptic plane. The feeble 11-year variation connected with solar cycle and strong 22-year pattern connected with solar magnetic cycle (as it is anticipated from drift theory) is visible in the timeline of the 27-day variation of the GCR anisotropy for 1965-2013. We find that number of days with the sign of the interplanetary magnetic field sector structure of northern hemisphere is about 10% larger than of southern hemisphere for all the solar activity minima since 1965, providing an independent evidence of a persistent southward offset of heliospheric neutral sheet as observed by the Ulysses mission.

week
0:0, MPH

S1-400

Cloudless days and nights and 2D model of the galactic cosmic ray intensity variations

[1,2], [3], [1], [3], [4]

[1]Institute of Math. and Physics, Siedlce University, Siedlce, Poland, [2]Institute of Geophysics, Tbilisi State University, Tbilisi, Georgia, [3]E. Kharadze Abastumani Astroph. Observatory, Ilia State University, Tbilisi, Georgia, [4]Inst. of Computer Science, Siedlce University, Siedlce, Poland

Annual distributions of the visually observed cloudless days (CD) and cloudless nights (CN) at Abastumani Astrophysical Observatory (41.75N, 42.82E; Georgia) in 1957-1993 are studied in relation with the galactic cosmic ray (GCR) intensity variations. We show that the interannual distributions of geomagnetic Ap index for CD and CN are different. For CD it has a semi-annual character, almost the same as Russell Mcpheron distribution, with peaks in March and September. We compose two dimensional (2D) non stationary model of galactic cosmic ray (GCR) propagation in heliosphere. In modeling we take into account new data of primary GCR proton spectrum in local interstellar medium (LISM). In model we also installed an annual changes of solar wind velocity U calculated from scattering diagram of U on Ap index. A choice of Ap index as a proxy for installation in modeling is connected with the existence of a correlation between Ap and the distributions of CD and CN.

week

0:0, MPH

S1-404

Modern status of cosmic ray stations ISTP SB RAS

[1]

[1]Institute

We describe changes in cosmic ray (CR) stations ISTP SB RAS work of the Siberian Branch of the Russian Academy of Science for 2012-2014. We describe measures for improvement of data presentation CR stations (IRKUTSK, IRKUTSK2, IRKUTSK3 and NORILSK) in real time. There are problems on each CR station. We present the ways by solving these problems.to provide data without failures and omissions every minute.

week

0:0, MPH

S1-409

Sporadic and recurrent Forbush-effects in deep solar minimum

[1], [2], [2], [2], [2], [1], [1], [1]

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Effects of high-speed solar wind streams from low-latitude coronal holes and coronal mass ejections (CMEs) on cosmic ray intensity in 2007 are studied. The database on Forbush effects created at IZMIRAN, with cosmic ray density and anisotropy calculated by the Global Survey Method (GSM) on the basis of Neutron Monitor network data has been used. Behavior of the mean characteristics by all the Forbush-effects in 2007 caused by coronal holes (interplanetary magnetic field intensity and solar wind velocity, 10 GV cosmic ray density and equatorial component of the cosmic ray anisotropy) is calculated by epoch method. Features of the Forbush-effects caused by high-speed solar wind streams from low-latitude coronal holes and coronal mass ejections are described.

week

0:0, MPH

S1-416

Electron-Proton and High Energy Telescopes of EPD for Solar Orbiter

[1], [1], [1], [1], [1], [1], [1], [2]

[1]1 Institute for Experimental and Applied Physics, University of Kiel, D-24118 Kiel, Germany, [2]2 University of Alcala, Alcala de Henares, Spain

The Energetic Particle Detector (EPD) suite for ESA's Solar Orbiter will provide key measurements to address particle acceleration at and near the Sun. The EPD suite consists of four sensors (STEP, SIS, EPT, and HET). The University of Kiel in Germany is responsible for the design, development, and build of EPT and HET (and STEP). The Electron Proton Telescope (EPT) is designed to cleanly separate and measure electrons in the energy range from 20 - 400 keV and protons from 0.02 - 15 MeV. It will cover the gap with some overlap between suprathermal electrons and protons measured by STEP and high energy electrons and protons measured by HET. The EPT relies on the magnet/foil-technique. The High-Energy Telescope (HET) on ESAs Solar Orbiter mission, will measure electrons from 300 keV up to 15 MeV, protons from 10 - 100 MeV, and heavy ions from 20 to 200 MeV/nuc. These measurement capabilities are reached by a combination of solid-state detectors and a scintillator calorimeter which allows use of the dE/dx vs. total E technique for particle identification and energy measurement. Here we present the current development status of EPT-HET units focusing on test and calibration results obtained with the engineering model and present plans for future activities.

week
0:0, MPH
S1-437
A year of operation of Melibea e-Callisto Solar Radio Telescope
12, 1, 1, 1
[1]Space Research Group-University of Alcal Spain, [2]Parque Cientfico y Tecnolgico de Guadalajara, Spain
The e-CALLISTO (Compound Astronomical Low-cost Low-frequency Instrument for Spectroscopy and Transportable Observatory) is a worldwide network with 24 hours a day solar radio burst monitoring. The e-CALLISTO network is lead by the Swiss Federal Institute of Technology Zurich (ETHZ Zurich), which work up collaborations with local host institutions. In 2013 the University of Alcal joined the e-CALLISTO network with the installation of two Solar Radio Telescopes (SRT): the Melibea-SRT that is located at Peralejos de las Truchas (Guadalajara) in operation from June and the EA4RKU-SRT that is located on the University of Alcal from February. The Spanish e-Callisto SRTs provide routine data to the network. Melibea-SRT once in operation is the e-Callisto-SRT with less interference over the network. We present a list of type II and type II radio-burst observed by Melibea during its first year of operation and study their relation with soft X-ray flares observed by GOES and Coronal Mass Ejections (CMEs) and Solar Energetic Particle (SEP) events observed by the Solar and Heliospheric Observatory (SOHO).

week
0:0, MPH
S1-438
Comparative study of solar events with ground based CR and VLF stations
1, 1, 2, 1, 1, 1, 1, 1
[1]Institute of Physics, University of Belgrade, Serbia, [2]University Union - Nikola Tesla, Belgrade, Serbia
In this work we present comparative analyses of extreme solar events (e.g. GLEs, FDs) with two different ground based techniques. The investigations have been done using cosmic-ray muon measurements and VLF wave measurements at the CR and VLF stations at the Institute of Physics in Belgrade, Serbia. Data from the world-wide neutron monitor network and from the GOES 15 satellite have been analyzed, as well. Impact of high energy solar events on the lower ionosphere and subsequent atmospheric events - Sudden Ionospheric Disturbances (SIDs), are analyzed in order to further comparatively investigate galactic cosmic-ray influence following coronal mass ejections.

week
0:0, MPH
S1-440
Solar particle events contribution in the space radiation exposure on electronic equipments
1, 1, 1, 2
[1]JSC URSC - ISDE, [2]JSC ISS

In the paper we are presenting the exploitation results of the Roscosmos space radiation exposure on electronic components engineering Monitoring System elements. The main elements of the monitoring system space-born segment are TID sensors operating on MNOSFET dosinetry principle. 38 TID sensors have been placed onboard 19 spacecrafts at the circular orbit 20000 km since October 2008. The analysis of the longtime flight data is presented. It is observed anomalous dose rate increasing events. The TID sensor data were analyzed in consideration of space weather characteristics measurements at the events dates including solar particles events. Calculation of different particles contribution in dose rate increasing were carried out. Results of calculation and experimental data comparison are presented in the paper. The calculation was carried out in consideration of space-born charge particles flux measurements and the real sensor shielding configuration. It was shown that solar particles exposure can be a cause of considerable dose rate increase and consequently electronic equipment failure. But the main cause of dose rate increasing events at the circular orbit 20000 km is electron exposure.

week
0:0, MPH
S1-443
A stochastic method of solution of the Parker transport equation
[1], [2], [3]
[1]Institute of Computer Science, Siedlce University, Siedlce, Poland, [2]Institute of Math. And Physics, Siedlce University, Siedlce, Poland
We present the recently developed model of the short- time variations of the galactic cosmic rays (GCR) intensity in the inner heliosphere. The model is based on the solution of the system of stochastic differential equations (SDEs) being equivalent to the Parker transport equation (PTE). We present the method of deriving from PTE the equivalent SDEs for the forward and backward Fokker-Planck equations in the heliocentric spherical coordinate system. The full three-dimensional diffusion tensor is applied. The SDEs are solved using different Monte Carlo techniques. The stochastic models results are compared with the previous finite difference method of numerical solutions of the PTE. The advantages and disadvantages of both methods of solution of the PTE are discussed.

week
0:0, MPH
S1-448
The Solar Polar Field on the cosmic-ray intensity modulation
[1], [1], [2], [2], [2]
[1]Faculty of Physics, National and Kapodistrian University of Athens, Athens, Greece , [2]Institute of Terrestrial Magnetism, Ionosphere and Radio Propagation after Pushkov-IZMIRAN, Moscow,
In this work the modulation of galactic cosmic-ray intensity based on solar and heliospheric indices for the solar cycle 23 (1996-2008) is studied. In previous works a number of different indices such as the sunspot number, the CME-index, the interplanetary magnetic field and the heliospheric current sheet tilt were selected to be the most appropriate ones in order to describe the cosmic ray intensity of 10 GV observed by the network of neutron monitors. The new approach in this work is the extension to the influence of the solar magnetic field parameters, the mean magnetic field and the polar magnetic field. With use of the wavelet analysis method a major periodicity of about 20-21 years was confirmed, indicating the existence of the 22-year cycle in CR variations. The best empirical relation of the cosmic ray modulation taking into account the sunspot number, the CME-index, the heliospheric current sheet tilt and the solar polar field was improved significantly to a RMSD of 8.9 percent instead to the previous one of about 10 percent between the observed and the calculated cosmic ray intensity variations.

week
0:0, MPH
S1-457
Recent Research Applications at the Athens Neutron Monitor Station

[1], [1], [1], [1,2], [1], [3]
[1]Nuclear & Particle Physics Department, Faculty of Physics, National and Kapodistian University of A, [2]IAASARS, National Observatory of Athens, Greece, [3]ISNET Company, Athens, Greece
The ground based neutron monitor measurements play a key role in the field of space physics, solar-terrestrial relations, and space weather applications. The Athens Cosmic ray group developed several research applications. These include the optimized automated Ground Level Enhancement Alert (GLE Alert Plus), which is currently a service under testing and evaluation by the European Space Agency, a simulation tool of the cosmic ray showers in the atmosphere, based on Geant4 and named DYnamic Atmospheric Shower Tracking Interactive Model Application (DYASTIMA) as well as a Space Weather Forecasting Center which provides a three day geomagnetic activity report on a daily basis. In this work, the input of the timely issued GLE Alerts in the protection of people and assets within the space environment is presented. The contribution of the DYASTIMA tool to the calculations of the radiation dose received by air crews and passengers within Earth's atmosphere, as well as the provision of high quality neutron monitor data processed by a series of a Filtering Algorithms such as Median Editor, ANN Algorithm and Edge Editor also developed by our group are discussed.

week
0:0, MPH
S1-458

On relation of the long period variations of galactic cosmic ray intensity interplanetary magnetic field turbulence

[1], [1], [1,2]
[1]Institute of Mathematics and Physics, Siedlce University, Poland , [2]Institute of Geophysics, Tbilisi State University, Tbilisi, Georgia
A new two-dimensional time dependent model describing the long period variations of the galactic cosmic ray GCR intensity has been developed. In model has been installed the changes of the rigidity spectrum exponent γ of the GCR isotropic intensity variations as a time dependent parameter. We use data of neutron monitors and IMF for the period of 1976 to 1987 as well. We show a clear relations between an exponent γ of the power law rigidity R spectrum of the galactic cosmic ray GCR intensity variations and exponents νy and νz of the power spectral density PSD of the By and Bz components of the interplanetary magnetic field IMF turbulence PSD. We show that an inverse correlations between γ and νy and between γ and νz are more clearly exhibited when the time changes of the resonant frequency range are calculated by in situ measurements of the solar wind velocity U and IMF module B during 1976 to 1987.

week
0:0, MPH
S1-463

Rigidity spectrum of the long-period variations of the galactic cosmic ray intensity in different epochs of solar activity

[1], [1], [1,2]
[1]Institute of Mathematics and Physics, Siedlce University, Poland, [2]Institute of Geophysics, Tbilisi State University, Tbilisi, Georgia
We have calculated the exponents νy and νz of the power spectral density (PSD) of the By and Bz components of the interplanetary magnetic field (IMF) turbulence PSD for different resonant frequency range, responsible for the scattering of GCR particles to which neutron monitors respond. Data of neutron monitors have been used to calculation exponent γ of the power law rigidity R spectrum of the galactic cosmic ray (GCR) intensity variations. Base on the strong inverse correlations between γ and νy and between γ and νy we find rigidity spectrum of the long-period variations of the galactic cosmic ray intensity in minima epoch of solar activity. We believe that inverse relations between changes of γ and νy and between γ and νz as a universal feature in descending and ascending epoch of solar activity.

week

0:0, MPH
S1-504
Magnetic clouds disturbances on solar energetic particles spectra
[1], [1], [1]
[1]Universidad de Alcala de Henares
Magnetic clouds (MC) and solar energetic particle (SEP) fluxes coming from the sun interact with each other while they evolve in the heliosphere. We have studied this relationship through SEP flux spacecraft measurements while a magnetic cloud was observed. As a preliminary step, we have classified the SEP flux profiles in MC from Leppings list according to some patterns found on them. The aim of this work is to evaluate the role of the arrival direction of the energetic particles into the magnetic cloud in those SEP selected in the study.

week
0:0, MPH
S1-557
Compound model of CR-diffusion: a fractional approach
[1], [1]
[1]Ulyanovsk State University
Cosmic ray transport process is considered in framework of the compound diffusion model, assuming decomposition of the process into the longitudinal (random motion along a magnetic force line) and transversal (motion with the force line, performing random walk in space). Originally, both these motions were considered as normal Gaussian processes. Nowadays, there exist some reasons to refuse the simple models and pass to more realistic models including finite velocity of free motion and multiscale (fractal) character of interstellar magnetic fields. The new (fractional) approach interprets the longitudinal component as a one-dimensional asymmetric walk of a particle with a finite constant speed and alpha-type asymptotic of the free path distribution. The corresponding integral equation becomes in long-time asymptotics a differential equation including material derivative of fractional operator.

The perpendicular component is conctructed by involving exponential truncation of free path distribution and coupling collision points with perpendicular displacement events. Analytic investigation shows that this model reveals different behavior in various time domains: we observe the superdiffusion in the parallel direction and subdiffusion in the perpendicular one in the intermediate time region, meanwhile the long-time asymptotics of the process is characterized by the normal regimes of both components. The numerical results are compared with those of other authors and the reasons of discrepancy are discussed.

week
0:0, MPH
S1-568
The importance of ground-based data in deriving the properties of relativistic SEPs
[1,2], [1], [2],
[1]INAF-IAPS, Via del Fosso del Cavaliere, 00133, Rome, Italy, [2]Nuclear and Particle Physics Section, Physics Department, National and Kapodistrian University of At
The Ground Level Enhancement (GLE) data recorded by the worldwide Neutron Monitor (NM) network are a useful resource for space weather modeling during solar extreme events. The derivation of Solar Energetic Particles (SEPs) properties through NM-data modeling, is fundamental for the study of solar-terrestrial physics, providing information that cannot be directly obtained by space techniques (e.g. the higher energy part of the spectrum). In this work we give a brief review of how the application of the Neutron Monitor Based Anisotropic GLE Pure Power Law (NMBANGLE PPOLA) model (Plainaki et al. 2010), can lead to the derivation of the characteristics of the relativistic SEP flux, at some point of the near-Earth magnetosphere, during a GLE. Technically, this is achieved through treating the NM network as an integrated omnidirectional spectrometer and solving the inverse problem. As test-cases, we present the results obtained for two different GLEs, i.e. GLE 60, on 2001 April 15, and GLE71 on 2012 May 17. We also discuss some future ideas on NM-data modeling in the context of space weather perspectives.

week
0:0, MPH
S2-154
Solar effects on Galactic Cosmic Rays and Terrestrial temperatures
[1,2], [3], [2]
[1]P.N.Lebedev Physical Institute, Moscow, Russia, [2]Department of Physics, Durham University, UK, [3]Department of Physics, Lancaster University, UK
Claims that cosmic rays have a significant effect on the terrestrial climate have a long history. We, ourselves, have argued that the apparent effect of cosmic rays is, in fact,due to changes in the solar irradiance. This has led to a deeper analysis of solar effects on climate, most notably the mean Global surface temperature. The role of terrestrial latitude (which also affects cosmic ray intensities) and time interval, to which the effects refer, are discussed. This is not to say that Global Warming at present is due to solar effects much is due to man made gases however, even recently, solar effects are not negligible.

week
0:0, MPH
S2-164
DYNAMICS OF LOWER BOUNDARY OF PROTON RADIATION BELT WITH PAMELA AND ARINA EXPERIMENTS DURING 2006 2014 YEAR.
[1], [1], [1], [1], [1], [1], [1], [1]
[1]NRNU MEPhI
PAMELA and ARINA experiments onboard satellite RESURS-DK1 are carried out since 2006 up to now. Main goal of PAMELA instrument is measurements of high energy antiparticles in cosmic rays while the ARINA instrument is intended studying high-energy charged particle bursts in the magnetosphere. And also both these experiments have possibility to study trapped particles in the inner radiation belt. Complex of these two instruments covers proton energy range from 30 MeV up to energy trapping limit (2 GeV). Continuous measurements with PAMELA and ARINA include falling and rising phases of 23/24 solar cycles. It is important because existing empirical radiation belt models do not able to calculate trapped particle fluxes with taking into account solar activity changing, e.g. widely using AP-8 model allows to evaluate proton fluxes just in two cases: for minimum or maximum of a solar cycle. In this report we present temporal profile of proton fluxes in the inner zone of the radiation belt (1.11¡L¡1.20, 0.18¡B¡0.22 Gs). Dependence of proton fluxes on level of solar activity (sunspot number) was measured in various phases of 23/24 solar cycle. At that it was shown that proton fluxes of energies¿30MeV at the solar minimum several times greater than at the solar maximum.

week
0:0, MPH
S2-209
Upgrading of Apatity Neutron Monitor
[1], [1], [1], [1]
[1]Polar Geophysical Institute of RAS, Apatity, Russia
Apatity neutron monitor (NM) has been deeply upgraded recently. New amplifier-discriminators developed in Polar Geophysical Institute were set. Also detecting tubes of NM were tested and calibrated with help of a weight magnitude analyzer. Due to this operation electric noise and interfering pulses are reduced. NM was equipped with a rapid registration system like in Barentsburg and Baksan. The system records time of a coming pulse with 1 microsecond accuracy. Having a "temporal snap shot" of sequence of NM pulses, it is possible to detect, separate and investigate different fast phenomena or transform the data to various forms. For example, the "large dead time" mode was saved and now realized via soft processing against hardware earlier. It is possible to get "a posteriori" NM data with any time resolution too.

week

0:0, MPH
S2-210
Multiplicity with little M and seasonal variation
[1], [1], [1]
[1]Polar Geophysical Institute of RAS, Apatity, Russia
A multiplicity phenomenon is on continuous study. Four stations (Barentsburg, Apatity, Moscow, Baksan) are equipped with a rapid recording system. In the present paper we are focusing on multiplicity events with little M (M=2-5). The usual detecting algorithm (which was developed on events with large M) is not suitable because there is not negligible probability to be a false event. New algorithm was made, based on specific conditions of little M event generation. Amount of events of M=2-5 is enough to get multiplicity profiles. Seasonal variation is observed on Barentsburg and Moscow stations and absent on Apatity and Baksan. Explanation of it is suggested.

week
0:0, MPH
S2-215
Data on cosmic ray variations during thunderstorms: Indication to existence of a slow large-scale atmospheric discharge
[1], [1], [1]
[1]Institute for Nuclear Research, Russian Academy of Sciences, Moscow
It is demonstrated that the data of an experiment studying variations of secondary cosmic rays during thunderstorms (carried out at Baksan Valley, North Caucasus) in their entirety indicate to existence of a new physical process: slow (several minutes) large-scale discharge between the top of a thundercloud and the ionosphere. This process reveals itself in different components. Most probably it is a sort of runaway electron breakdown, but occurring near the threshold of this process, when operating field exceeds the critical field only slightly. Hypothesis about this process is supported by many indirect data, but at the moment some efforts are undertaken to see the light glow produced by this discharge directly using video cameras installed very far (tens of kilometers) from the place of observation viewing the region above the cloudy layer. Preliminary results of these observations are promising.

week
0:0, MPH
S2-250
Correlations of cosmic ray particle events during thunderstorms with geomagnetic pulsations
[0], [0], [0], [1]
[1]Institute for Nuclear Research, Russian Academy of Sciences, [2]Pushkov Institute of Terrestrial Magnetism, Ionosphere and radio Wave Propagation, Russian Academy o
Previously (K. Kh. Kanonidi et al., Strong variations of cosmic ray intensity during thunderstorms and associated pulsations of the geomagnetic field, ASTRA, 2011, vol. 7, pp. 279282) it has been demonstrated by us that some events of short spurious variations of secondary cosmic rays during thunderstorms obviously correlate with geomagnetic pulsations measured locally several kilometers apart from the Baksan air shower array used as a particle detector. Now, an analysis is made of two couple of thunderstorms taking into consideration magnetic data of a remote station (Moscow). Numerous correlations of magnetic pulsations with cosmic ray data are confirmed, but, quite unexpectedly, amplitudes of magnetic pulses turn out to be larger at Moscow magnetic variation station, so that the geomagnetic pulsations are locally suppressed at the region of thunderstorm. Possible implications of this effect are discussed.

week
0:0, MPH
S2-263

Magnetospheric transmissivity for cosmic rays during selected recent events with interplanetary/geomagnetic disturbances

[1], [2], [2]

[1]Pavol Jozef Safarik University, Faculty of Science, Kosice, Slovakia, [2]Institute of Experimental Physics, SAS, Kosice, Slovakia

For four intervals with moderate geomagnetic disturbances, namely (a) DOY 316-321 in 2012, (b) DOY 274-276 in 2013, (c) DOY 49-51 in 2014 and (d) DOY 58-59 in 2014, the changes of cut-off rigidity (COR) for selected positions of neutron monitors in Europe were computed in Tsyganenko 96 (Ts96) and Tsyganenko 2005 (Ts05) models. While for (a) the profile of CR intensity quantitatively corresponds to expected COR variations with the increase at middle latitudes during strong Dst depression in the recovery phase of FD, for (b) the FD profile is similar to that of Dst, for (c and d) the Dst depression not corresponding to FD leads to CR increases at middle latitude NMs consistently with COR computed values. The examples stress the importance of including anisotropy of CR flux in interplanetary space to computations of COR based only on geomagnetic field models. Correlations of COR and of CR intensity at selected NMs during the four intervals with the solar wind parameters, with IMF and Dst is checked. Differences in COR for Ts96 and Ts05 are discussed. Comparison of the results with those obtained in earlier similar type studies is done.

week
0:0, MPH
S2-335

Detecting upward-directed charged particle fluxes in MSL/RAD

[0], [0], [0], [0], [1], [1], [2], [0]

[1]Institute for Experimental and Applied Physics, Christian- Albrechts- University of Kiel, Germany, [2]Space Division, Southwest Research Institute, Boulder, CO, USA, [3]Southwest Research Institute, Earth, Oceans & Space Department, Durham, NH, USA

The goals of the Mars Science Laboratory (MSL) mission are searching for past and present biological life evidences, studying the geological and geochemical planetary processes, and characterizing the radiation environment on the Martian surface. The Radiation Assessment Detector (RAD) onboard the MSL rover is designed to measure the full spectrum of radiation. One of the science goals of RAD is to enable the verification of atmospheric radiation transport models. This can be done by comparing predicted upwards- and downwards-directed radiation fluxes at RAD with observations. The downwards-directed radiation flux consists of Galactic Cosmic Rays modified by the Martian atmosphere, and the upwards-directed radiation flux consists of secondary particles generated in the Martian soil. We investigate the upwards-directed radiation flux using a Geant4 simulation model of the MSL rover and the atmosphere below it. Through this, we obtain the resulting upwards-directed spectra as seen by the RAD instrument and compare it with the downwards-directed component. Then, we investigate the detector response signatures generated by the upwards- and downwards- directed flux components respectively. Lastly, we show the presence of both upwards- and downwards-directed fluxes in data collected by the RAD instrument.

week
0:0, MPH
S2-341

Energy and time characteristics of high-energy electron bursts in near-Earth space

[1], [1], [1], [1]

[1]National Research Nuclear University MEPhI

Many satellite experiments showed interrelation between changes of particle fluxes in near-Earth space and various magnetospheric and geophysical phenomena. In this report we focus on temporal and energy characteristics of bursts of high-energy electrons in the inner region of the Earths magnetosphere (L<2). In order to study the variations of electron characteristics during the observation of the bursts, caused by lightning or seismic activity, numerical modeling the propagation of particle cloud formed by electrons, precipitated from radiation belt, has been carried out. There is a relationship between energy distribution and temporal profile of electrons of burst in case of local precipitation. In this report the results of simulation are analyzed and compared with data from ARINA and VSPLESK satellite experiments, which are carrying out since 2006 till now.

week
0:0, MPH
S2-391
Temperature effect correction for URAGAN based on CAO, GDAS, NOAA data
[1], [1,2,3]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), [2]Dipartimento di Fisica dell Universita di Torino et INFN, [3]Istituto di Fisica dello Spazio Interplanetario INAF
For the analysis of muon flux variations caused by extra-atmospheric processes it is necessary to introduce corrections for meteorological effects. For temperature effect (TE) correction it is necessary to know the temperature profile of the atmosphere. As a rule, this profile is measured by meteorological balloons two or four times a day. Alternative sources are satellite observations and data obtained from models of atmosphere used for weather forecasting. Vertical temperature profiles obtained from NOAA satellites, GDAS (Global Data Assimilation System) and CAO data (Central Aerological Observatory, Russia) for standard isobaric levels were compared. Mean value of temperature difference for most levels does not exceed 1 K. Comparison of URAGAN data corrected for TE with CAO information, satellites and GDAS shows a good agreement. Counting rate and anisotropy of the muon flux corrected for meteorological effects for 2007-2014 are presented.

week
0:0, MPH
S2-414
Fine structure of multiplicity in neutron monitor and differences between small and large multiplicities
[1], [1], [1]
[1]Polar Geophysical Institute
We proceed to study events of multiplicity in neutron monitors (NM) at the stations Barentsburg, Apatity, Moscow and Baksan. These stations are equipped with an advanced data acquisition system which is able to register every NM pulse: which NM tube produced the pulse and how many microseconds elapsed since the previous pulse. The time resolution is as high as 1 microsecond. So we have the possibility to study a fine temporal and spatial structure of multiplicity events. The analysis shows that the structure changes with increasing multiplicity number M. At M ¿ 30-35 the origin of a multiplicity can be explained only by the local air shower. The intensity and size of such air showers were determined.

week
0:0, MPH
S2-472
Gamma-ray increase, atmosphere conditions and secondary cosmic rays
[1], [1], [1]
[1]Polar Geophysical Institute of RAS
Based on many years database accumulated on Apatity cosmic ray station, which has hundreds events of increasing gamma background in the surface layer of the atmosphere, a study of possible correlations between increases and conditions of a ground atmospheric layer was carried out. The vast majority of these events is accompanied by rainfall and cloud cover. This conclusion was before based on subjective assessments of weather, now it is proved by real observations. About a dozen parameters determining conditions of the low atmosphere, which could be important factors affecting the increases, are used. Increases usually occur at low nimbostratus clouds. For the increases are also characteristic calm weather with rain and low clouds. Storms, blizzards, and drizzle are not accompanied by an increase of gamma background. There is a time gap between maxima rain intensity and gamma-ray increase. Any other secondary cosmic rays dont -ray show significant relation between its fluxes and atmosphere condition excepting pressure.

week

0:0, MPH
S2-487
Magnetopause and Bow Shock Crossings: What can be learned from CHANDRA measurements
[1], [1]
[1]IEAP, Christian-Albrechts-Universität zu Kiel, Kiel, Germany
Chandra is a telescope designed to detect X-ray emission from very hot regions of the universe. In order to do so Chandra is situated outside the (X-ray absorbing) atmosphere and orbits in altitudes from 10,000 up to 140,000 km above the ground, not only crossing the radiation belts but also the magnetopause as well as the terrestrial bow shock. Onboard Chandra also an Electron Proton Helium Instrument (EPHIN) is present which measures the electron (250 keV up to more than 8.7 MeV) and proton (4 MeV to more than 53 MeV) energy spectra. Here we will investigate whether or not the magnetopause and bow shock crossings can be seen in the proton and electron data and what we can learn from our findings.

week
0:0, MPH
S2-511
The neutron monitor network: A tool to detect solar neutrons
[1], [2], [1,3], [1]
[1]University of Oulu, Finland, [2]Ioffe Physical-Technical Institute, St. Petersburg, Russia, [3]Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences, Sofia, Bulgaria
When energetic protons are accelerated during solar flares in the solar atmosphere, they may produce, in nuclear collisions with the ambient matter, secondary neutrons. Since these neutrons are not affected by the magnetic field and can escape the Sun and reach the Earth. Features of these neutrons carry direct information on the in-situ conditions at the flare site. The main tool to measure solar neutrons on ground was the world neutron monitor (NM) network, later complemented by a network of dedicated solar neutron telescopes. Although measurements of solar neutrons have long history, detailed computation of the specific yield function of the NM to solar neutrons was somewhat uncertain. Here we revise the computation of the NM yield function for solar neutrons, based on new Monte-Carlo simulation of the neutron-induced atmospheric cascade, and reassess the sensitivity of the world NM network to solar neutron events.

week
0:0, MPH
S2-512
Neutron Monitor Yield Functions: Revisited approach
[1,2], [1], [3]
[1]University of Oulu, Finland, [2]Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences, Sofia, Bulgaria, [3]Ioffe Physical-Technical Institute, St. Petersburg, Russia
A neutron monitor provides a routine measure of cosmic ray variations in the vicinity of Earth. Here we present a new yield function of the standard sea-level 6NM64 neutron monitor for primary proton and alpha cosmic ray nuclei. The computations were made using Planetocosmics and CORSIKA Monte-Carlo tools for atmospheric cascade simulation. Fluxes of secondary neutron and protons were obtained using the standard electromagnetic model and QGSP_BIC_HP hadron interaction model. A realistic curved atmospheric model was applied. An updated information concerning NM registration efficiency for secondary neutrons and protons was used. The NM yield function is obtained by convolution of secondary particle flux and NM registration efficiency. In addition the effect of the geometrical correction of the neutron monitor effective area is considered. This correction enhances the relative impact of higher-energy cosmic rays, namely with energy above 5-10 GeV/nucleon in NM count rate. The newly calculated yield function, corrected for this geometrical factor is fully consistent with the experimental latitude surveys of neutron monitors performed during three consecutive solar minima in 1976-77, 1986-87 and 1996-97.

week

0:0, MPH
S2-523

Long-term measurements with the Phoswich Instrument for Neutrons and Gammas - Secondary Neutrons and the variation of terrestrial radiation

[1], [1], [1], [2], [1], [2]

[1]University of Kiel , Institute of Experimental and Applied Physics, [2]Helmholtz Zentrum Mnchen, German Research Center for Environmental Health (GmbH), Institute of Radi

The portable detector "Phoswich Instrument for Neutrons and Gammas" (PING) was designed to measure secondary neutrons in the Earth's atmosphere. After several sucessful balloon flights and measurements in aircraft, the detector was installed for long-term measurements at the Environmental Research Station Schneefernerhaus (2660 m above sea level) on the Zugspitze mountain in Germany. With the anticoincidence made of a CsI(Na) scintillator, effects like precipitation radioactivity and count rate variations due to radon concentration changes can be detected and compared to measurements from other experiments taken at the same time.

week
0:0, MPH
S2-549

The Temperature Effect on Cosmic-Ray Intensity as observed at Mid latitude City

[1], [1], [1−2], [1], [2]

[1]National Centre For Mathematics and Physics, King Abdulaziz City For Science and Technology, Riyadh , [2]Physics and Astronomy Department, King Saud University

The investigation of meteorological effects is of special importance to the study of the cosmic ray variations, since only after correction for such effects are the measured data able to provide information on the variations due to causes beyond the Earths atmosphere. In this paper, we analyze the temperature effects on the records of the cosmic ray recorded by KACST detector. This detector has monitored secondary cosmic ray muon since 2002 at (Riydah, Saudi Arabia; lat 24 43; long. 46 40; alt. 613 m) where the geomagnetic rigidity cutoff, Rc, is 13 GV. Two methods were used. The first is to correlate the surface temperature with the cosmic ray mouns and the second is based on the study the temperature effect at the altitude of maximum production of secondary cosmic rays.

week
0:0, MPH
S2-553

Forbush decrease prediction based on the remote solar observations

[1], [1]

[1]Hvar Observatory, University of Zagreb

Forbush decreases are short term depressions in the galactic cosmic ray flux observed at Earth and in the interplanetary space, caused by interplanetary counterparts of coronal mass ejections (CMEs). The shape, duration and magnitude of these decreases are related to enhanced solar wind speed and interplanetary magnetic field associated with interplanetary coronal mass ejections (ICMEs), as well as a turbulent sheath region preceding some of the ICMEs.

The relationship between in situ properties of ICMEs and Forbush decreases was studied intensively and enables using real-time near-Earth in situ measurements as a forecast of the approaching ICME-related Forbush effects 1 hour in advance. We study the relationship between remote solar observations of CMEs and the associated solar flares and employ these observations to forecast the approaching ICME-related Forbush effects 1 day in advance.

week
0:0, MPH
S2-556

RADIATION MEASUREMENTS DURING THE CRUISE TO AND ON THE SURFACE OF MARS WITH MSL/RAD

[1], [1], [2], [3], [3], [4], [5], [1]

[1]Southwest Research Institute, Boulder, CO, USA, [2]Southwest Research Institute, Durham, NH, USA, [3]CAU Kiel, Germany, [4]JPL, CalTech, Pasadena, USA, [5]DLR Cologne, Germany

The Radiation Assessment Detector (RAD) on board the Mars Science Laboratory's (MSL) Curiosity rover is the first ever instrument to measure the energetic particle radiation on the surface of Mars. The main scientific goal of the RAD instrument is to characterize the radiation environment on the surface of Mars by making detailed measurements of the radiation dose, linear energy transfer (LET) spectra, and charged and neutral particle spectra. In addition to the surface measurements, RAD was also operating for large parts of the 253-day cruise to Mars. Combined, these measurements give unique insight to the expected radiation exposure for a potential manned mission to the red planet. The average absorbed tissue-equivalent dose rate during the cruise was found to be 0.48 ±0.08 mGy/day, while for the first 300 days of surface operations the measured dose was 0.21 ±0.04 mGy/day. By measuring the LET spectrum the absorbed dose can be converted into the biologically-relevant dose equivalent, resulting in values of 1.84 ±0.30 mSv/day during cruise and 0.64 ±0.12 mSv/day on the surface of Mars. RAD further encountered several solar energetic particle (SEP) events during cruise and surface operations. SEP events can create significant enhancements of the radiation exposure on short time scales, depending on the magnitude of such an event. For example, the five SEP events encountered during cruise contributed about five percent to the total measured dose equivalent in 253 days. The occurrence rate of SEP events strongly depends on the state of the solar activity, emphasizing the importance of continued radiation measurements throughout the solar cycle.

week
0:0, MPH
S4-227

Analysis of Cosmic Rays with the HADES tRPC wall

[1,3], [2,3]

[1]LabCAF, Univ. Santiago de Compostela, Spain, [2]Tech. Univ. Darmstadt, Germany, [3]on behalf of the TRAGALDABAS Collaboration

During the commissioning of the HADES tRPC TOF wall at the GSI (Darmstadt, Germany), around 40 million cosmic ray data were taken with a stack of two high-granularity detectors with an area slightly greater than one square meter, a mean cell size of about 100 cm2 and a time resolution below 100 ps. The detectors were placed horizontally, with their axes pointing in the East-West direction, at a distance of about 30 cm. The mean position resolution was approximately 1cm in North-South and about 3 cm in the East-West directions. This arrangement did allow to reconstruct the arrival direction of cosmic rays with an accuracy of about 1 in the north-south and about 3 in the east-west directions.

The knowledge of the time of arrival of the particles, together with its position and direction, did also allow to estimate the arrival direction of the cosmic air showers and to analyze their temporal microstructure with a resolution never reported before at the Earths surface. Several analysis has been also undertaken related with several fields of interest like the study of the Earths magnetic field, the solar activity or the temperature of the stratosphere.

The obtained results show that high granularity and high time resolution tracking detectors can be of interest for improving our understanding of the evolution of cosmic ray induced air showers in the atmosphere, to find new signatures allowing a better estimation of the parameters describing the high energy primary cosmic rays and to develop new techniques allowing the use of those cosmic ray detectors for the study of other phenomena.

week
0:0, MPH
S4-289

Interpretation of Voyager 1 data on low energy cosmic rays in galactic wind model

[1], [1], [2]

[1]IZMIRAN, Troitsk, Moscow 142190, [2]University of Maryland, College Park, MD 20742, USA

The local interstellar energy spectra of galactic cosmic ray protons, nuclei and electrons down to a few MeV/nucleon were directly measured in the experiment on the board of the Voyager 1 spacecraft. We suggest interpretation of these data based on our models of cosmic ray acceleration in supernova remnants and propagation in galactic wind selfconsistently driven by cosmic rays.

week
0:0, MPH
S4-386
Are the primary cosmic ray and EAS spectra the same or not?
[1]

[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)
Usually it is believed that EAS energy is equal or is proportional to primary particle energy. Of course, taking into account fluctuations in hadron interactions and in EAS development, some difference between EAS and PCR energy spectra appears but the slopes of these spectra are the same with a good accuracy. However, in spite of numerous experiments and various models for interpretation of results of EAS observations, the full picture of PCR energy spectrum and composition is absent. In this talk, an alternative approach in which model of PCR interaction at the knee energy is drastically changed is considered. The consequences for interpretation of results on primary energy spectrum and composition in frame of this model are analyzed. It is shown that practically all peculiarities in the behaviour of primary spectrum and composition can be explained. The results agree with experimental data. Some possible experiments to check the predictions of this approach are proposed.

week
0:0, MPH
S4-421
Event-by-event study of CR composition with reflected Cherenkov light
[1], [1], [1], [1], [1], [2,1], [2,1], [1]

[1]Skobeltsyn Institute of Nuclear Physics Lomonosov Moscow State University, [2]Faculty of Physics M.V. Lomonosov Moscow State University
We present the first reasonably well systematically controlled results on cosmic ray (CR) composition obtained with the reflected Cherenkov light method. The fraction of CR light component above 30 PeV was reconstructed using the data of the SPHERE experiment which observes Vavilov-Cherenkov radiation of extensive air showers (EAS), reflected from a snow surface of Lake Baikal. We discuss the main sources of systematic uncertainty of the CR light component fraction, a possibility to enhance sensitivity to the primary nuclei mass number by means of multidimensional methods, as well as the ways to lower the energy threshold of CR composition study.

week
0:0, MPH
S4-484
First experimental results of WILLI-EAS detection system
[1], [2]

[1]Horia Hulubei National Institute for Physics and Nuclear Engineering, Romania, [2]Institut fur Kernphysik, KIT - Karlsruher Institut fur Technologie, Germany, [3]Department of Physics, University of Bucharest, Romania
The measurements of the muon charge ratio in individual EAS can bring useful information on the mass of the primary particle that initiate the shower or on the hadronic interactions that govern the propagation through the atmosphere. For this purpose, the WILLI-EAS detection system, consisting of a mini-array, for the identification of the EAS, placed in coincidence with the WILLI calorimeter, for charge ratio measurements, was built and is in operation at IFIN-HH, Bucharest.

The array consists of 12 scintillator detector stations of approximately 1 m^2 each and is designed to measure the charged particle component of the extensive air showers in the 10^{13}-10^{15} eV primary energy range. Preliminary experimental results show a good reconstruction for parameters like shower core, arrival direction and lateral distribution. Presently the possibility to extend the

array with another 12 stations to increase the quality of the reconstruction is under investigation.

week
0:0, MPH
S4-490
GEANT 4 simulation of the Helios cosmic ray telescope E6
[1], [1], [1], [1]
[1]Christian-Albrechts-Universität zu Kiel
In October 2011, ESA announced the selection of Solar Orbiter as one of the Cosmic Vision M missions, with the launch envisioned for 2017. Thus, we will have again in 2020, 40 years after the pioneering Helios mission, a spacecraft that determines in-situ the properties and dynamics of plasma, fields and particles in the inner heliosphere. In contrast to the two Helios spacecraft Solar Orbiter is equipped with sophisticated remote sensing instrumentation. However, we have to realize that due to the different design of the two missions, Solar Orbiter is a three-axis stabilized and the two Helios are spinning spacecraft, Solar Orbiter will not surpass Helios results in all respects, e.g. the energetic particle telescopes can only determine the particle intensities for a limited range of pitch-angle directions. Therefore it is worthwhile to revisit the energetic particle measurements together with the solar wind and magnetic field data from Helios in light of better theoretical understanding and advanced analysis and modeling techniques developed during the past 20 years. In this contribution we will present a GEANT 4 simulation of the response function of the Helios E6 experiment, that measured electrons in the energy range from a few 100 keV to above 10 MeV, ions from 1 MeV/nucleon to above 50 MeV/nucleon, and its application to the data analysis for a selected number of solar energetic particle events.

week
0:0, MPH
S4-514
A template method for measuring the iron spectrum in cosmic rays with Cherenkov telescopes
[1]
[1]DESY Zeuthen
The energy-dependent abundance of elements in cosmic rays is an important part of the understanding of acceleration and propagation of cosmic rays. Most current results are obtained either from direct measurements by balloon/satellite borne detectors, or from indirect measurements by air shower detector arrays on the earth's surface. Imaging Air Cherenkov Telescopes, used mainly in gamma-ray astronomy, can also be used for cosmic ray physics. They can measure the direct Cherenkov light emitted by heavy nuclei as well as the Cherenkov light emitted by their air showers and are thus sensitive to the charge and energy of cosmic ray particles with energies of tens to hundreds of TeV.

I will introduce a template-based method that can be used to reconstruct charge and energy of primary particles simultaneously from images taken by IACTs. With this, we can separate heavy nuclei, eg. iro n,from lighter cosmic rays, and thus measure the abundance and spectrum of these nuclei in the range of tens to hundreds of TeV.

week
0:0, MPH
S4-550
Secondary to Primary Ratios of Nuclei Below z=30 n a Dynamic Spiral-Armed Cosmic Ray Model
[1], [1], [1], [2]
[1]The Hebrew University, [2]Tel-Aviv University
Over the years, significant effort was devoted to understand cosmic ray propagation in the galaxy from the energy dependence of the secondary to primary ratios in galactic cosmic rays. We develop a fully three dimensional numerical code describing the diffusion of cosmic rays in the Milky Way. This code enables us to explore a model in which a large fraction of the cosmic ray acceleration takes place in the vicinity of galactic spiral arms and that these spiral arms are dynamic. Recently, the analysis of cosmic ray propagation from dynamic spiral arms was shown to have an important imprint on the Boron to Carbon ratio (Benyamin et al.

2014). We showed that the effect of having dynamic spiral arms is to limit the age of cosmic rays at low energies. This is because at low energies the time since the last spiral arm passage governs the Cosmic Ray (CR) age, and not diffusion. Using the model, the observed spectral dependence of the secondary to primary ratio is recovered without requiring any further assumptions such as a galactic wind, re-acceleration or various assumptions on the diffusivity. In particular, we obtain a secondary to primary ratio which increases with energy below about 1 GeV. We extended our previous model by upgrading the spallation network up to Silicon and including the Iron and sub-Iron elements (from Scandium to Nickel) necessary for simulating the sub-Iron to Iron ratio. We show that the latter ratio is consistently recovered with the same model parameters that explain the B/C ratio. We also empirically derive the energy dependent probability for K-capture isotopes by fitting the observed ^{49}Ti/^{49}V and ^{51}V/^{51}Cr ratios.

week
0:0, MPH
S4-558
Galactic Propagation of Cosmic Rays from Individual Supernova Remnants
[1], [1], [1], [1]
[1]Ruhr-Universitt Bochum, Universittsstrae 150, D-44780 Bochum
It is widely believed that supernova remnants are the best candidate sources for the acceleration of cosmic rays at least up to PeV energies. Indeed, the gamma-ray spectra of some supernova remnants can be well explained by assuming the decay of neutral pions which are created in hadronic interactions. Therefore, fitting the corresponding gamma spectra, allows to derive the spectra of cosmic rays at the source which are locally injected into our Galaxy. Using these spectra as a starting point, we propagate the cosmic rays through the Galaxy using the publicly available GALPROP code. In this talk, we will present first results on the contribution of those SNRs to the total cosmic ray flux and discuss implications.

week
0:0, MPH
S4-559
Galactic Propagation of Cosmic Rays from Individual Supernova Remnants
[1], [1], [1], [1]
[1]Ruhr-Universitt Bochum, Universittsstrae 150, D-44780 Bochum
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rst results on the contribution of those SNRs to the total cosmic ray ux and discuss implications.

week
0:0, MPH
S4-560
Galactic Propagation of Cosmic Rays from Individual Supernova Remnants
[1], [1], [1], [1]
[1]Ruhr-Universität Bochum, Universitätsstraße 150, D-44780 Bochum
It is widely believed that supernova remnants are the best candidate sources for the acceleration of cosmic rays at least up to PeV energies. Indeed, the gamma- ray spectra of some supernova remnants can be well explained by assuming the decay of neutral pions which are created in hadronic interactions. Therefore, fitting the corresponding gamma spectra allows to derive the spectra of cosmic rays at the sources which are locally injected into our Galaxy. Using these spectra as a starting point, we propagate the cosmic rays through the Galaxy using the publicly available GALPROP code. In this talk, we will present first results on the

contribution of those supernova remnants to the total cosmic ray flux and discuss implications.

week
0:0, MPH
S5-135
Mass Composition of Cosmic Rays at Ultra High Energies by Yakutsk Data
[1], [1]
[1]Yu. G. Shafer Institute of Cosmophysical Research and Aeronomy
In the paper, we describe methods for the analysis and presents the results for the mass composition of cosmic rays, obtained by using these techniques over a large time span. The data were obtained at Small Cherenkov array over a 20 year period of continuous observation and 40 years of observations at the main Yakutsk array. Results comparison of past and present, it would seem not eligible because used in the analysis of different models: 80 of the last century - mainly used the Landau hydrodynamic model (1953), Belenky (1955), and in recent years modern model QGS, QGSjet 01, QGSjetII 03 , QGSjetII 04, which developed on the basis of the modern theory of quantum chromodynamics Kaidalov et al. (1986), Kaidalov, Kalmykov et al. (1986). Nevertheless, the experimental data and their interpretation in the framework of different models of hadron interactions in both the first and second cases indicate a change in the mass composition in the energy range 10^{16} - 10^{18} eV Knurenko et al. (2006) , Knurenko et al. (2007) Berezhko et al. (2012), as confirmed by independent results obtained by other EAS arrays , for example KASKADE-GRANDE, Tunka.

week
0:0, MPH
S5-136
Radio Signal Correlation at 32 MHz With Extensive Air Showers Parameters
[1], [1]
[1]Yu. G. Shafer Institute of Cosmophysical Research and Aeronomy SB RAS
The paper present correlation of radio signal with air shower parameters: shower energy E_0 and depth of maximum X_{max}. It is shown that from radio emission measurements of air showers one can obtain individual showers parameters and mass composition of cosmic rays.

week
0:0, MPH
S5-137
Optic Detectors Calibration for Measuring Ultra High Energy Extensive Air Showers Cherenkov Radiation by 532 nm Laser
[1], [1], [1]
[1]Yu.G. Shafer Institute of cosmophysical research and aeronomy SB RAS
Calibration of a PMT matrix is crucial for the theatment of the data obtained with Cherenkov tracking detector. Furthermore, due to high variability of the aerosole abundance in the atmosphere depending on season, weather etc. A constant monitoring of the atmospheric transparency is required during the measurements. For this purpose, besides traditional methods, a station for laser atmospheric probing is used.

week
0:0, MPH
S5-139
Atmospheric Circulation Influence During Winter on Measurements at Yakutsk Array
[1], [1]

[1]Yu. G. Shafer Institute of Cosmophysical Research and Aeronomy SB RAS
The paper presents long-term observations of the atmosphere in Yakutsk region. Analysis of the data for 40 year period indicates a gradual strengthening of cyclonic activity in the region and hence the increase of the average winter temperature, increase variations of the rest atmosphere, which greatly softens the continental climate of Central Yakutia.

week
0:0, MPH
S5-240
Atmospheric Influence on Space-Based Observation of High-Energy Cosmic Rays
[1]

[1]Karlsruhe Institute of Technology (KIT)
JEM-EUSO has the capability to open the door for a new generation of cosmic ray experiments utilizing extensive air showers. On board the ISS, this fluorescence telescope will orbit the Earth in a 90 minutes cycle at an altitude of approximately 400 km. Given a field of view of about 60°, JEM-EUSO will be capable of monitoring a surface area with a radius of about 250 km.

Atmospheric state functions (pressure, temperature, etc.) affect significantly the shower development and the light production and transmission. Global near real-time data of those actual states will be necessary for simulation and reconstruction of shower events. To serve this purpose, sets from Global Data Assimilation Systems (GDAS) are taken into account.

The impact of varying atmospheric conditions on light emission and transmittance has been studied in detail. By these studies the importance of atmospheric scattering and reflection from ground on the fraction of Cherenkov light received by JEM-EUSO is stressed. In addition, for any telescope measuring UV light from above an altitude of 40 km the influence of the ozone layer is essential. Based upon air shower simulation, quantitative numbers of ozone attenuation will be presented.

week
0:0, MPH
S5-290
On the determination of source spectrum of ultra high energy cosmic rays
[0], [0], [0]

[1]IZMIRAN, Troitsk, Moscow 142190, Russia
The calculations of source spectra of extragalactic cosmic rays with ultra high energies are made based on the solution of the inverse problem for a system of transport equations that describes the propagation of protons and nuclei with energies 10**18 to 10**21 ev in the expanding Universe filled with the background radiation. The source spectra are determined from the cosmic ray measurements at the Earth fulfilled in the Auger, Telescope Array and Hires experiments. It is assumed that protons and Iron nuclei are the most abundant species in the sources. The results are shown for the case when the source spectra are similar functions of particle magnetic rigidity and when this assumption is not fulfilled and the source spectra are found from the observed cosmic ray spectrum and the Auger data on energy dependence of (lnA).

week
0:0, MPH
S5-292
On the determination of source spectrum of ultra high energy cosmic rays
[1], [1], [1]

[1]IZMIRAN, Troitsk, Moscow 142190, Russia
The calculations of source spectra of extragalactic cosmic rays with ultra high energies are made based on the solution of the inverse problem for a system of transport equations that describes the propagation of protons and nuclei with energies 10^{18} to 10^{21} eV in the expanding Universe filled with the background radiation. The source spectra are determined from the cosmic ray measurements

at the Earth fulfilled in the Auger, Telescope Array and HiRes experiments. It is assumed that protons and Iron nuclei are the most abundant species in the sources. The results are shown for the case when the source spectra are similar functions of particle magnetic rigidity and when this assumption is not fulfilled and the source spectra are found from the observed cosmic ray spectrum and the Auger data on energy dependence of $\langle \ln A \rangle$.

week
0:0, MPH
S5-312
Current status of the AMIGA extension of the Pierre Auger Observatory
[1], [2]
[1]UNICAMP - State University of Campinas, [2]Pierre Auger Observatory
A low energy enhancement for the Pierre Auger Observatory was built to extend its measurements to the energy region down to 10^{17} eV, thus getting new insights in the ankle region, believed to host the transition between galactic and extragalactic cosmic rays. Part of this enhancement is an infill of water Cherenkov tanks, each with a buried scintillator counter aside, allowing to directly count muons (adding information for composition studies). Results on the energy spectrum as measured by AMIGA and first performances from the muon counters will be presented and discussed.

week
0:0, MPH
S5-358
Measurements of the energy deposit of inclined muon bundles in CWD NEVOD
[1], [1], [1], [1,2,3]
[1]National Research Nuclear University MEPhI, [2]Istituto di Fisika dello Spazio Interplanetario - INAF, [3]Universita di Torino
First results of investigations of the energy deposit of inclined muon bundles in the ground based Cherenkov water detector NEVOD are presented. As a measure of the muon bundle energy deposit, the total number of photoelectrons detected by PMTs of the Cherenkov calorimeter is used. For each event, the local muon density at the observation point and the muon bundle arrival direction are estimated from the data of the coordinate-tracking detector DECOR. Registration of the bundles in the wide range of zenith angles allows to explore the interval of primary particle energies from 10 PeV to 1 EeV. Measurement results are compared with CORSIKA based simulations of EAS muon component. It is found that the mean energy of muons detected within the bundles rapidly increases with the zenith angle and reaches about 400-500 GeV near the horizon.

week
0:0, MPH
S5-496
Spectra of protons and nuclei in the energy range $10^{10} \div 10^{20}$ eV in framework of the galactic cosmic ray origin
[1], [1], [1]
[1]Altai State University, Radiophysics and Theoretical Physics Department
We consider the problem of the cosmic ray spectrum formation assuming that cosmic rays are produced by galactic sources. The fractional diffusion equation proposed in our recent papers is used to describe the cosmic rays propagation in interstellar medium. We show that in the framework of this approach and at generation spectrum exponent 2.85 it is possible to explain the locally observed basic features of the cosmic rays in the energy region $10^{10} \div 10^{20}$ eV: difference between spectral exponents of protons and other nuclei, mass composition variation, "knee" problem, flattening of the primary spectrum for $E \geq 10^{18} \div 10^{19}$ eV.

week
0:0, MPH
S6-173

Last results of the ANTARES neutrino telescope

[1],
[1]IFIC - Instituto de Física Corpuscular (CSIC-UV)

The ANTARES detector is an underwater neutrino telescope placed in the Mediterranean Sea 40 km off the Southern coast of France, at a depth of 2.5 km. Conformed by 885 photomultiplier tubes distributed in twelve detection lines, it has an instrumented volume of 0.1 km^3 where neutrinos are detected through the Cherenkov light emitted by the muons they can produce in the surroundings of the detector. It aims to detect cosmic neutrino sources, like AGNs, GRBs, μ-quasars or SNRs and is also suitable for the detection of dark matter within the Sun and/or Galactic Centre and coincidences of gravitational-waves and supernovas with neutrinos. ANTARES is sensitive to a wide-range of other phenomena, like neutrino oscillations or exotics like nuclearites and magnetic monopoles. Due its location in the Northern hemisphere, ANTARES' results are of particular interest in the light of IceCube recent detection of cosmic neutrinos. Results from the various physics analyses are presented.

week
0:0, MPH
S6-202

Pressure and temperature correction of atmospheric muon data

[1], [1], [1], [1], [1], [1], [1]
[1]Institute of Physics, University of Belgrade, Serbia

We present results of continuous monitoring of cosmic-ray muon intensity at ground and shallow underground level at the Belgrade cosmic-ray station. The cosmic-ray muon measurements have been performed since 2002, by means of plastic scintillation detectors. The scintillator counts are corrected for atmospheric pressure for the whole period of measurements and, as well, for vertical temperature profile for the period of last six years. The results are compared with other correction methods available. One-hour time series of cosmic-ray muon intensity at ground level are checked for correlation with European neutron monitors, with emphasis on occasional extreme solar events (e.g. FD, GLE).

week
0:0, MPH
S6-237

Muon measurements at Belgrade shallow underground laboratory

[1], [1], [1], [1], [1], [1], [1], [1]
[1]Institute of physics, University of Belgrade, Serbia

At Belgrade shallow underground location (25 m.w.e.), the detected CR muons originate from primaries with energies starting from just above solar modulation. We investigate the possibility of utilizing those measurements for the study of muons and processes to which these muons are sensitive. For this purpose a series of simulations of muon generation and propagation is done, based on the CORSIKA air shower simulation package. Coincidences were included, what yields information that is not accessible via inclusive measurements. These investigations were combined with experimental data from Belgrade underground CR station in order to find an optimal detector configuration for extending the energy range of cosmic rays as much as possible for a given site.

week
0:0, MPH
S6-418

Methods for the model independent analysis of the Muon Neutrino Energy Spectrum within IceCube

[1], [1]
[1]TU Dortmund

A model independent analysis of the neutrino energy spectrum is an excellent contribution to constrain its composition and shape. We will present the separation and unfolding techniques used to realise such an analysis on muon neutrinos within IceCube in its 79 and 86 string configuration. With a background to signal ratio of 10^6 IceCube makes high demands on the separation of the

data. Especially the high energy tail with its low statistics requires a reliable validation of the separation approach. Our approach uses a random forest and bootstrap validation to obtain a sample of high quality muon neutrino induced events with a purity above 99.2%. To achieve a model independent analysis of the spectrum, we used TRUEE with its Tikhonov regularization and covered more than 4 orders of magnitude reaching 3.2 PeV. Furthermore we will give an outlook on the methods of starting follow-up studies.

week
0:0, MPH
S6-552
Neutrinos from SN 1987a
[2]

[1]Uni Heidelberg
Neutrinos from SN1987a - A Puzzle Revisited
Gerd Schatz Heidelberg University and Karlsruhe Institute of Technology
The smallest one of the four detectors which claim to have observed neutrinos from SN1987a registered the events more than 4 h earlier than the other three ones. This claim is not usually accepted because it is difficult to understand that the other (and larger) detectors did not register any events at the same time. It is shown that microlensing of the neutrinos by a star inbetween the SN and the Earth can enhance the neutrino intensity locally by more than an order of magnitude. Such a configuration is improbable but not impossible. Essential for this to happen is the fact that the source diameter is very small, of order 100 km. So if two bursts of neutrinos were emitted by SN1987a at a separation of 4 h it could be explained easily that the smallest detector observed the first burst but missed the second one and vice versa.

week
0:0, MPH
S6-554
The Global Neutrino Network
[1]

[1]DESY
The idea to closer link the neutrino telescope projects underwater and ice has been discussed in the international community of high-energy neutrino astrophysicists for several years. Finally, at October 15, 2013, representatives of the collaborations ANTARES, BAIKAL, IceCube and KM3NeT signed a Memorandum of Understanding on a Global Neutrino Network (GNN). The poster will illustrate the various fields of synergy and cooperation, including alert and multi-messenger campaigns, point-source searches with combined sky maps or cross-checks of results with different systematics. It will argue why a combination of detectors on the multi-cubic kilometer scale at the North and at the South are necessary to fully open the window, which IceCube has started to open, although until now only by a tiny slit. Once the Northern projects KM3NeT (Mediterranean Sea) and GVD (Lake Baikal) will have evolved to a comparable scale as IceCube, GNN might be even transformed to a more formal consortium, tentatively christened GNO (Global Neutrino Observatory).

week
0:0, MPH
S6-555
The GVD neutrino project in Lake Baikal
[1]

[1]DESY
The second-stage neutrino telescope BAIKAL-GVD in Lake Baikal will be a research infrastructure with a focus on studying astrophysical neutrinos at highest energies. The telescope will be built in two phases. The first phase will comprise 12 clusters, each consisting of 8 strings equipped with optical modules. The final configuration will consist of 27 clusters. The clusters are

functionally independent. Each cluster is connected to shore by its own electro-optical cable. The geometrical volume is 0.4 km^3 for phase 1 and larger than 1.5 km^3 for phase 2. During the R&D phase in 2008 to 2010, the basic elements of GVD (new optical modules, FADC readout units, underwater communications and trigger systems) have been developed, produced and tested in situ by stationary prototype strings. The advanced prototyping/early construction phase of GVD has started in 2011 with the partial deployment and operation of a first demonstration cluster which is named DUBNA. The length of the strings of this cluster is 375 meters, seven peripheral strings encircle a central string at a radius of 60 meters. Each string comprises 24 OMs spaced by 15 m at depths between 950 and 1300 m below the surface. Meanwhile 5 of the 8 strings are installed, the rest will follow in April 2015. Phase 1 with its 12 clusters is planned to be completed within about 5 years. It will cross-check the recent IceCube results with a different systematic approach and search for point sources of astrophysical neutrinos. Together with the KM3NeT telescope in the Mediterranean Sea, GVD can be understood as part of a distributed infrastructure of neutrino detectors at the Northern hemisphere.

week
0:0, MPH
S7-114
Very high energy gamma-emission of Perseus Cluster
[1], [1]
[1]P.N. Lebedev Physical Institute, RAS
The cluster of galaxies in Perseus, along with other clusters, have long been considered as possible candidates for the sources of high and very high energy gamma-ray emission generated by various mechanisms. Long-term studies of the central galaxy in the cluster, NGC 1275, are being carried out in the SHALON experiment. We presented the results of fifteen-year-long observations of the AGN NGC 1275 at energies 800 GeV40 TeV discovered by the SHALON telescope in 1996. The data obtained at very high energies, namely the images of the galaxy and its surroundings, and the flux variability indicate that the TeV gamma-ray emission is generated by a number of processes: in particular, part of this emission is generated by relativistic jets in the nucleus of NGC 1275 itself. Whereas, the presence of an extended structure around NGC 1275 is evidence of the interaction of cosmic rays and magnetic fields generated in the jets at the galactic center with the gas of the Perseus cluster.

week
0:0, MPH
S7-115
Long-term studies of the Cygnus Region and its objects
[1], [1]
[1]P.N. Lebedev Physical Institute, RAS
Cygnus Region contains the number of powerful sources of radio and X-ray emission which are supposed as a potential TeV-emitting objects. One of them is the massive binary system Cyg X-3. The results of seventeen-year observations of the Cyg X-3 at energies 0.8 - 85 TeV, detected by the SHALON telescope in 1995 are presented. A number of high activity period of Cyg X-3 were detected with SHALON at energies > 800 GeV during the all period of observation. The last two significant increase of flux have detected in May 2009 and October 2011, which is correlated with flaring activity at lower energy range of X-ray and/or at observations of Fermi LAT. Also, we present the results of long-term observations of the Cygnus region which are revealed the gamma-ray emission from the one of nearby object - γCygni SNR, placed at 2^o from Cyg X-3. The results of γCygni SNR observation by SHALON are presented with spectral energy distribution, images and integral spectra at energies 800 GeV - 50 TeV.

week
0:0, MPH
S7-116
SHALON observations of Active Galactic Nuclei at red shift from z=0.0179 to z=1.375
[1], [1], [1], [1], [1], [1], [1], [1]

[1]P.N. Lebedev Physical Institute, RAS
The radio-loud active galactic nuclei having the radio emission arising from a core region rather than from lobes are often referred to as blazars and include Flat Spectrum Radio Quasars (FSRQ) and BL Lacertae (BL Lac) objects. During the period 1992 - 2014, SHALON has been used for observations of the metagalactic sources NGC1275 (z=0.0179), Mkn421 (z=0.031), Mkn501 (z=0.034), Mkn180 (z=0.046), 3c382 (z=0.0578), 4c+31.63 (z=0.295), OJ 287 (z=0.306), 3c454.3 (z=0.859), 4c+55.17 (z=0.896), 1739+522 (z=1.375). We present results of long term observations of FSRQ: among them are known object 3c454.3, high-red shifted quasar 1739+522 (4c+51.37) and 4c+31.63, 4c+55.17 as well as BL Lac type object OJ 287 which was recently detected by SHALON mirror telescopes. The observation results are presented with integral spectra, images and spectral energy distributions for each of sources at energies above 800 GeV. A number of variability periods in different wavelengths including VHE gamma rays were found.

week
0:0, MPH
S7-401
Simulation of the Tunka Area International Gamma-ray Advanced experiment (TAIGA)
[1]

[1]University of Hamburg
Up to 100 TeV, Imaging air Cherenkov telescopes (IACTs) have proven to be the instruments of choice for GeV/TeV gamma-ray astronomy due to their good reconstrucion quality and gamma-hadron separation power. However, sensitive observations at and above 100 TeV require very large effective areas, which is difficult to achieve with the imaging technique.

The alternative to IACTs are shower front sampling arrays (non-imaging technique or timing-arrays) with a large area and a wide field of view. Such experiments provide good core position, energy and angular resolution, but only poor gamma-hadron separation. Combining both experimental approaches, using the strengths of both techniques, could optimize the sensitivity to the highest energies. The TAIGA project plans to combine the existing non-imaging HiSCORE array with small HEGRA-like imaging telescopes. This presentation covers the simulation results of this hybrid approach.

week
0:0, MPH
S8-1000
Radio detection of air showers at the Pierre Auger Observatory
[1], [2]

[1]Karlsruher Institut fr Technologie (KIT)
High-energy cosmic rays impinging onto the atmosphere of the Earth induce cascades of secondary particles: extensive air showers. Many of the particles in a shower are electrons and positrons. The induced electrons and positrons interact with the geomagnetic field and emit radiation. We detect such radiation at frequencies of tens of MHz with the Auger Engineering Radio Array (Aera) in Argentina. Objective is to investigate the properties of cosmic rays at the expected transition from a Galactic to an extragalactic origin at energies around 10^{17} to 10^{18} eV. We will discuss the recent progress in radio detection of High-energy cosmic ray with Aera. To this end, we will elaborate on the shower reconstruction methods and our measurements of shower properties, such as the lateral distribution of the radio emission at ground level. In addition, we will present methods to reconstruct the properties of the primary particle from the radio data.

week
0:0, MPH
S8-174
Preliminary Results from A Small Cosmic Ray Detector
[1], [1], [1−2], [1], [2]

[1]National Centre For Mathematics and Physics, King Abdulaziz City For Science and Technology, Riyadh , [2]physics and Astoron-

omy department, King Saud University, Riydah, Saudi Arabia
This paper presents the installation of a small cosmic ray muon detector (0.25 m2) in Riyadh (lat. 24 43; long. 46 40; alt. 613 m, Rc=13 GeV), Saudi Arabia. This simple detector records the arrival flux of the cosmic ray particles which have been traversed the heliosphere, and the rate of muon detections reflects the intensity of these particles. The intensity is controlled by the day to day properties of the heliosphere, which is in a state of constant change as the outflowing solar wind is affected by solar activity. The technical aspects of this detector will be briefly discussed. Some of the obtained results will be presented.

week
0:0, MPH
S8-234
DAQ and synchronization system for Tunka-HiSCORE array on the base of DRS-4
[1], [1], [1]
[1]SINP MSU, Moscow, Russia
DAQ and time synchronization system for the Tunka-HiSCORE array has been developed. The system consists of 8-channel optical station board (OSB) for digitization of signals from anodes and dynodes of 4 PMTs of the optical station and synchronization boards (SB) placed in the DAQ center. ALL boards are designed on the basis of DRS-4 chip and FPGA Xilinx Spartan-6. OSBs and SB are connected via single-mode optical fibers. An accuracy of time synchronization is ¡ 1 ns. Time step of digitization may be changed from 0.2 to 1 ns. The dead time of OBS is smaller than 0.5 ms. The DAQ system demonstrates stable operation during all winter season in the 9-station Tunka-HisCORE array.

week
0:0, MPH
S8-275
Characterization of an LSO scintillator for space applications
[1], [1], [1], [1], [1], [1]
[1]IEAP, CAU Kiel
Currently BGO ($Bi_4Ge_3O_{12}$) is widely used for the detection of high-energy particles in space applications because of its high stopping power, the non-hygroscopic characteristics and its ruggedness with respect to mechanical stress. The new Cerium doped LSO (Lu_2SiO_5) offers the same benefits with higher light output capabilities and a significantly shorter decay time. We investigated key characteristics of an LSO scintillator in view of its use in space missions. We characterized the intrinsic spectrum which originates from the decay of ^{176}Lu and showed that it consists of three different parts originating from different effects. Furthermore we investigated the light-quenching of LSO for heavy ions with measurements performed at the Heavy Ion Medical Accelerator in Chiba (HIMAC), Japan. We found that LSO is a promising candidate for future space missions.

week
0:0, MPH
S8-340
Development of the ground-based compact neutron detector
[1], [1], [1], [1], [1], [1], [1]
[1]Lebedev Physical Institute of Russian Academy of Sciences
In the scope of scientific collaboration between Lebedev Physical Institute RAS, University Mackenzie (Brazil) and National Institute for Space Research (INPE, Brazil) we are currently involved in the developing of ground-based compact neutron detector. This experimental device will help us to study high energy phenomena at the Sun and dynamic processes in the Earth's atmosphere. The device consists of several detecting modules: neutron detectors, pressure and temperature sensors. Each detecting module transmits data to the interface module that connects to computer via serial interface. Additionally, the special software components have been developed to allow user to receive, record and display data from detecting modules. This software provides possibilities of viewing real-time and history data. We present and discuss the first experimental results obtained by constructed neutron detector.

week
0:0, MPH
S8-422

Quasispherical module of Cherenkov water detector NEVOD

[1], [1,2,3]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), [2]Dipartimento di Fisica dell Universita di Torino et INFN, [3]Istituto di Fisica dello Spazio Interplanetario INAF

Quasispherical module (QSM) of the Cherenkov water detector NEVOD consists of six low-noise photomultiplier FEU-200 with flat cathodes (diameter 17 cm) directed along the axes of orthogonal coordinate system. Such configuration allows to detect Cherenkov radiation arriving from all directions with almost equal efficiency. The results of measurements of QSM characteristics in the operating volume of the NEVOD detector during registration of Cherenkov radiation of single muons at different distances and angles are discussed. Muon tracks are allocated with good angular and spatial accuracy by the coordinate detectors placed on the outer walls of water detector tank.

week
0:0, MPH
S8-426

EAS array of the NEVOD Experimental Complex

[1], [1,2,3]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), 115409, Moscow, R, [2]Dipartimento di Fisica dell' Universita di Torino et INFN, 10125 Torino, Italy, [3]Istituto di Fisica dello Spazio Interplanetario - INAF, 10133 Torino, Italy

In 2002-2009, at the experimental complex NEVOD-DECOR (Moscow) the method of EAS registration based on the new variable - local muon density spectra (LMDS) at large zenith angles - was developed. Analysis of the results has shown the anomalous behavior of LMDS at energies above 100 PeV. Deployment around the NEVOD-DECOR complex of the setup for detection of EAS with energies of 1-100 PeV using traditional method will allow to determine characteristics of showers and to narrow the energy range of primary CR particles responsible for muon bundle generation. For this purpose, the NEVOD-EAS setup (0.4 sq. km) based on KASCADE-Grande detectors, is being deployed on the roofs of MEPhI laboratory buildings. The features of the array setup, providing detection, data acquisition and primary processing, time synchronization and events selection as well as the results of studying of detector characteristics are discussed in the talk.

week
0:0, MPH
S8-446

Large-scale drift chamber detector for registration of near-horizontal muons

[1], [1,2]
[1]National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), [2]Institute for High Energy Physics, Protvino

The large-scale coordinate detector for registration of near-horizontal muon flux of ultrahigh energy is being developed in MEPhI. Detector is based on the drift chambers from the neutrino experiment at the IHEP accelerator U-70, their key advantages are the large effective area (1.85 sq.m), good coordinate and angular resolution with small number of measuring channels. Detector will operate as part of the experimental complex NEVOD, in particular, jointly with Cherenkov water detector (CWD) with volume of 2000 cubic meters. The project of the detector, its design and principle of joint operation with CWD and other installations of the complex are presented. The results of studies of drift chamber characteristics are discussed.

week

0:0, MPH
S8-455
The Amplitude Calibration of the Tunka Radio Extension (Tunka-Rex)
[1],
[1]Institut für Kernphysik, Karlsruhe Institute of Technology (KIT)
Tunka-Rex is a detector for the radio detection of cosmic ray air showers in Siberia. It consists of 25 radio antennas, distributed over an area of 1 km^2. It is co-located with Tunka-133, an air-Cherenkov detector for cosmic ray air showers. Triggered by Tunka-133, Tunka-Rex records the radio signal of air showers with energies above 10^{17} eV. Its goal is to probe the capabilities of a radio detector, especially for the determination of the elemental composition of cosmic ray primaries. To compare the measurements of Tunka-Rex to other radio detectors or to models describing the radio emission, the radio signal in each station has to be reconstructed in terms of physics units. Therefore, all hardware components have to be calibrated. It will be shown how these calibrations are performed. The impact on the analysis of air shower measurements will be discussed and the reconstructed amplitudes of events in the first seasons of data taking will be compared to the predictions of simulations.