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4. High energy cosmic rays (HE-CR I)

## **Study of extensive air shower structure around the axis with ARGO-YBJ**

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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/cm<sup>2</sup> 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.