

Abstract number: S4-183

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

## Explaining the knee by Cosmic Ray Escape from the Galaxy

Kachelriess, Michael<sup>1</sup>, Semikoz, Dmitri<sup>2</sup> and Giacinti, Gwenael<sup>3</sup>

<sup>1</sup>NTNU

<sup>2</sup>APC

<sup>3</sup>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  $\tau_{esc}$  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.