Contribution ID: **3** Type: **not specified**

Understanding the anisotropy of TeV cosmic rays

Saturday, 28 September 2013 11:15 (25 minutes)

Recent IBEX observation of a ribbon structure in energetic neutral atom emissions indicates that the level of turbulence in the interstellar magnetic field is quite low. The quasilinear theory of particle transport predicts a very large parallel diffusion and a very small perpendicular diffusion. Applying this extremely anisotropic diffusion to cosmic ray transport from a past nearby point source, we find that there will most likely be a large particle intensity gradient perpendicular to the magnetic field direction. The gradient can change with particle energy rapidly because it is sensitive to the magnitude of perpendicular diffusion coefficient. While cosmic ray anisotropy from particle diffusion still points towards the point source, drift anisotropy or b cross gradient anisotropy, which is enhanced from the perpendicular diffusion anisotropy by the ratio of particle gyroradius to perpendicular mean free path, is always perpendicular to the magnetic field. In the paper, we will demonstrate how the combination the Compton-Getting effect, diffusion and drift can result in various behaviors of large-scale cosmic ray anisotropy. In the mean time, the large-scale anisotropy can be break into medium-scale anisotropy when the particles are slightly deflected by the heliospheric magnetic field.

Primary author: Prof. ZHANG, Ming (Florida Institute of Technology)

Presenter: Prof. ZHANG, Ming (Florida Institute of Technology)

Session Classification: Understanding the anisotropy of TeV cosmic rays - Ming Zhang, FL Institute of Technology

Track Classification: Ming Zhang