



The Astroparticle Physics Conference 34th International Cosmic Ray Conference July 30 - August 6, 2015 The Hague, The Netherlands

Contribution ID: 1326

Type: Oral contribution

The Galactic Magnetic Field and UHECR Optics

Friday 31 July 2015 11:00 (15 minutes)

Our understanding of the Galactic magnetic field (GMF) has improved tremendously in recent years. The Jansson-Farrar (2012) (JF12) GMF model is currently the most realistic and comprehensive model available. It was constrained by fitting all-sky Faraday Rotation Measures of ~40k extragalactic sources, simultaneously with WMAP polarized (Q,U) and total synchrotron emission maps, which together provide more than 10,000 independent datapoints, each with measured astrophysical variance. The talk will give a concise review of the JF12 model and its derivation, with emphasis on which features of the GMF are well and poorly established. The data unambiguously demand a large scale coherent component to the halo field which is a diverging-spiral centered on the Galactic center, with field lines running from South to North. In addition to the coherent component, the JF12 model describes the spatial variation of the random field strength and additionally has a "striated" random component, in both disk and halo. The puzzles posed by the large scale coherent halo and disk magnetic fields, and their possible origins, will be discussed and comparison to external galaxies will be made. The state-of-knowledge about the coherence length of the random field and the local environment of the solar system will be summarized.

A good model of the Galactic magnetic field is crucial for determining the sources of UHECRs, for modeling the transport of Galactic CRs (the halo field provides a heretofore-overlooked escape route for by diffusion along its field lines), and for calculating the background to dark matter and CMB-cosmology studies. I will present new results on the lensing effect of the GMF on UHECRs, which produces multiple images and dramatic magnification and demagnification that varies with source direction and CR rigidity, and show movies of VHECR propagation from a transient source at the Galactic Center and from the solar neighborhood.

Collaboration

- not specified -

Registration number following "ICRC2015-I/"

388

Author: Prof. FARRAR, Glennys (New York University)

Co-authors: KHURANA, Deepak (New York University); SUTHERLAND, Michael; AWAL, Nafian (New York University)

Presenter: Prof. FARRAR, Glennys (New York University)

Session Classification: Parallel CR05 TH/aniso

Track Classification: CR-TH