Contribution ID: **18** Type: **not specified**

Modeling Cosmic Ray Acceleration by Galactic Wind Termination Shocks

Tuesday, 9 May 2017 15:06 (18 minutes)

Diffusive shock acceleration (DSA) at supernova remnant (SNR) shock fronts is thought to accelerate galactic cosmic rays (CRs) to energies below the knee, while an extragalactic origin is presumed for CRs with energies beyond the ankle. CRs with energies between 3 × 1015 and 1018 eV, which we dub the "shin," have an unknown origin. It has been proposed that DSA at galactic wind termination shocks, rather than at SNR shocks, may accelerate CRs to these energies. Our work uses the galactic wind model of Bustard et al. (2016) to analyze whether galactic wind termination shocks may accelerate CRs to shin energies within a reasonable acceleration time and whether such CRs can subsequently diffuse back to the Galaxy, where they can interact with dense ambient material to produce gamma-rays and neutrinos. I will argue for acceleration times on the order of 100 million years rather than a few billion years, as assumed in some previous works, and I will outline our analytic formulae, applicable to any wind model, for CR acceleration. Even with generous assumptions, we find that very high wind velocities are required to set up the necessary conditions for acceleration beyond 1017 eV. We also estimate the luminosities of CRs accelerated by outflow termination shocks, including estimates for the Milky Way wind.

Primary author: Mr BUSTARD, Chad (University of Wisconsin - Madison)

Co-authors: COTTER, Cory (UW-Madison); ZWEIBEL, Ellen (UW-Madison)

Presenter: Mr BUSTARD, Chad (University of Wisconsin - Madison)

Session Classification: Cosmic Rays

Track Classification: Cosmic Rays - Convenor: Andreas Haungs, KIT