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

Contribution ID: **558** Type: **Oral contribution**

Systematic Behavior of Heavy Ion Spectra in Large Gradual Solar Energetic Particle Events

Thursday 30 July 2015 11:45 (15 minutes)

Our Sun accelerates ions and electrons up to near-relativistic speeds in at least two ways; magnetic reconnection during solar flares is believed to produce the impulsive or ^{3}He-rich solar energetic particles (SEPs), while diffusive shock acceleration at fast coronal mass ejection - or CME-driven shock waves are thought to produce the larger gradual SEPs. Despite recent advances in our understanding of the properties (e.g., time variations, spectral behavior, longitudinal distributions, compositional anomalies etc.) of large SEP events, the relative roles played by many important physical processes remain poorly understood. These effects include variations in the seed populations, the geometry and speed of the shock, the presence or absence of a preceding CME from the same active region, scattering by ambient turbulence or by self-generated Alfvén waves during acceleration and transport, and the direct presence of flare accelerated material at energies above ∼10 MeV/nucleon. Observations and theoretical studies have indicated that many of these effects may manifest in the spectral properties of H and other heavy elements. In this paper, we present results from a survey of the energy spectra of ∼0.1-500 MeV/nucleon H-Fe nuclei in 46, isolated and well-connected large gradual SEP events observed by instruments onboard ACE, GOES, SAMPEX \& SoHO and determine how the spectral fit parameters such as the break or roll-over energies vary with the ion's Charge-to-Mass (Q/M) ratio. In particular, we compare our results with predictions of existing and developing models to understand why some large SEP events exhibit species-dependent spectral breaks that vary strongly with the ion's Q/M ratio while others do not.

Collaboration

– not specified –

Registration number following "ICRC2015-I/"

503

Primary author: DESAI, Mihir (SwRI)

Co-authors: Dr SMITH, Charles (UNH); Dr COHEN, Christina (Caltech); Dr MCCOMAS, David (SwRI); Dr LI, Gang (UNH); Dr MASON, Glenn (JHU/APL); Dr DAYEH, Maher (SwRI); Dr SCHWADRON, Nathan (UNH); Dr MEWLADT, Richard (Caltech); Dr EBERT, Robert (SwRI)

Presenter: DESAI, Mihir (SwRI)

Session Classification: Parallel SH 01 SEP I

Track Classification: SH-EX