

# Solar Energetic Particles (SEP), Solar Modulation and Space Radiation: New Opportunities in the AMS-02 Era #2

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## Review of Diffusive Shock Acceleration modeling of Solar Energetic Particle Events

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An overview of the theoretical modeling of acceleration of solar energetic particles at interplanetary shocks will be presented. The basic tenets of diffusive shock acceleration will be discussed in the framework of particle acceleration at coronal mass ejection-driven shocks using the Particle Acceleration Throughout the Heliosphere (PATH) code. The original PATH code was restricted to a single spatial direction. Recently, Hu et al., 2017 have extended the PATH model to study particle acceleration at 2D CME-driven shocks and the subsequent 2D transport. The new model and code, now called iPATH, follows the propagation of a CME and the shock it drives in the ecliptic plane from 20 solar radii to 2 AU. Particle acceleration at the shock now depends on both the parallel and perpendicular diffusion coefficients and therefore depends on the shock-obliquity as it propagates from the Sun. We discuss the extension of the basic physics introduced in the original Zank et al., 2000 model two spatial dimensions. Basic properties of modeled time intensity profiles and particle spectra as well as particle pitch angle distributions are shown for two example CME shocks.

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