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# Particle Energization at Collisionless Shock Waves and Particle Transport in the Interplanetary Medium

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Collisionless shocks are an ubiquitous phenomena in astrophysical plasmas in the form of bow shocks upstream of magnetized planetary bodies (and unmagnetized objects like comets and Venus), interplanetary shocks, supernova blast waves, and stellar astrospheres. Despite their ubiquity, there are still numerous processes associated with collisionless shocks that are not well understood. One of the more critical unknowns involves the processes by which particles are energized at collisionless shocks and how they are transported throughout the surrounding medium. This is a critical issue as collisionless shocks are thought to generate some of the most energetic particles in the universe in addition to causing space weather hazards for robotic assets and humans in space. We will discuss some of the known and observed energization mechanisms and discuss unknowns that motivate future work.

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