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Particle Acceleration at Shocks Moving Through Turbulent Plasmas JOE GIACALONE, University of Arizona — I will discuss the physics of charged-particle acceleration at astrophysical shocks moving through turbulent plasmas, from the perspective of lessons learned from *in-situ* observations in the Heliosphere. Diffusive shock acceleration theory is widely accepted and used routinely to model cosmic-ray acceleration at astrophysical shocks, but *in-situ* Heliospheric observations present challenges to our understanding of the basic physics involved. The observations also provide significant insight on important unsolved aspects of this problem such as the injection problem, the maximum energy, and the role of the magnetic-field geometry. The presence of pre-existing plasma and field turbulence plays a critical role, particularly with regards the acceleration of low energy ions. When pre-existing large-scale turbulence is included in the theory and numerical models, it is found that shocks are efficient accelerators of low-energy ions, even thermal plasma, and the acceleration efficiency has no obvious dependence on the magnetic obliquity of the shock. I will show a few examples from theory, modeling and observations, and discuss their implications.

Joe Giacalone
University of Arizona

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