Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Magnetic field amplification and particle acceleration in high Mach number shocks FREDERICO FIUZA, SLAC National Accelerator Laboratory — The amplification of magnetic fields is a central ingredient in understanding particle acceleration in supernova remnant shocks. I will present results from multi-dimensional particle-in-cell simulations of shock formation and particle acceleration for different magnetization levels. These first principles simulations, for unprecedented temporal and spatial scales, help bridge the gap between fully kinetic and hybrid modeling. The results show that depending on the magnetization the turbulence responsible for particle injection and acceleration is determined by different processes, which include Weibel and Bell-type instabilities, but also magnetic reconnection. At high Mach numbers both electrons and ions are shown to be efficiently injected and accelerated. I will discuss the importance of these results for current astrophysical models and the possibility of studying these magnetic field amplification and particle acceleration processes in near future high energy density laboratory experiments.

Frederico Fiuza
SLAC National Accelerator Laboratory

Date submitted: 24 Jul 2015 Electronic form version 1.4