Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Geometric integration of the Vlasov-Maxwell system with a variational particle-in-cell scheme JONATHAN SQUIRE, HONG QIN, WILLIAM TANG, Princeton Plasma Physics Laboratory — A fully variational, unstructured, electromagnetic particle-in-cell integrator is developed for integration of the Vlasov-Maxwell equations. Using the formalism of Discrete Exterior Calculus [1], the field solver, interpolation scheme and particle advance algorithm are derived through minimization of a single discrete field theory action. As a consequence of ensuring that the action is invariant under discrete electromagnetic gauge transformations, the integrator exactly conserves Gauss's law. This work was supported by USDOE Contract DE-AC02-09CH11466.

[1] M. Desbrun, A. N. Hirani, M. Leok, and J. E. Marsden, (2005), arXiv:math/0508341

Jonathan Squire
Princeton Plasma Physics Laboratory

Date submitted: 18 Jul 2012 Electronic form version 1.4