

Abstract Submitted  
for the DPP16 Meeting of  
The American Physical Society

**Exact Energy and Momentum Conservation in Variational Macro-Particle Plasma Models**<sup>1</sup> B. A. SHADWICK, E. G. EVSTATIEV, NAM NGUYEN, Department of Physics and Astronomy, University of Nebraska - Lincoln — We consider a class of variational macro-particle plasma models that exhibit simultaneous conservation of energy and momentum. These models retain translation invariance by using a Fourier representation of the electromagnetic fields in place of a spatial grid. That is, the Fourier amplitudes of the fields are the fundamental quantities. From the discrete Lagrangian, a canonical Hamiltonian system is obtained in the usual way, for which we introduce a symplectic integrator. We present a general formulation of the method with examples drawn from 1-1/2D studies of intense laser-plasma interactions. We comment on the relative merits of the Lagrangian vs. Hamiltonian formulations and discuss efficiency and practicality of using this technique in three dimensions.

<sup>1</sup>Supported by the National Science Foundation under Contract No. PHY-1104683

Brad Shadwick  
University of Nebraska - Lincoln

Date submitted: 15 Jul 2016

Electronic form version 1.4