
Contribution ID: **255** Type: **Poster**

# Canonical Electrodynamics and Continuous Symmetries in Discrete Reductions

*Tuesday, 23 July 2024 18:00 (1h 30m)*

In reducing the Low Lagrangian to a finite system for numerical computation it is generally the case that basic physical properties such as momentum and charge conservation are lost. Using a macro-particle reduction of the charge distribution function we explore the connection between the non-canonical treatment and a fully-canonical treatment recognizing that the use of electromagnetic potentials implies a constrained Hamiltonian system even when no gauge choice is made. For the canonical system, a loss of a conservation law directly implies a loss of a continuous symmetry; we see that charge and momentum conservation rely on properties that are effected differently by the method of discretization. We present here discretization schemes which preserve the symmetries needed to conserve charge or momentum in an effort to better understand the necessary structures and determine if a useful discrete canonical system can maintain both conservation laws.

## Working group

WG1 : Laser-driven plasma wakefield acceleration

**Primary authors:** HIGUET, Adam (University of Nebraska - Lincoln); SHADWICK, Brad

**Presenter:** HIGUET, Adam (University of Nebraska - Lincoln)

**Session Classification:** Poster [Atrium]