

Abstract Submitted  
for the DPP16 Meeting of  
The American Physical Society

**Variational approach to low-frequency kinetic-MHD in the current-coupling scheme**<sup>1</sup> CESARE TRONCI, Department of Mathematics, University of Surrey, JOSHUA BURBY, Courant Institute of Mathematical Sciences, New York University — Hybrid kinetic-MHD models describe the interaction of an MHD bulk fluid with an ensemble of hot particles, which is described by a kinetic equation. When the Vlasov description is adopted for the energetic particles, different Vlasov-MHD models have been shown to lack an exact energy balance, unless non-inertial force terms are inserted in the kinetic equation. These force terms arise from fundamental approaches based on Hamiltonian and variational methods. In this work we apply Hamilton's variational principle to formulate new current-coupling kinetic-MHD models in the low-frequency approximation (i.e. large Larmor frequency limit). More particularly, we formulate current-coupling hybrid schemes, in which energetic particle dynamics are expressed in either guiding-center or gyrocenter coordinates.

<sup>1</sup>Financial support by the Leverhulme Trust Research Project Grant No. 2014-112 is greatly acknowledged.

Cesare Tronci  
Department of Mathematics, University of Surrey

Date submitted: 09 Jul 2016

Electronic form version 1.4