Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

**The semi-implicit, adaptive Multi-Level Multi-Domain method for Particle In Cell plasma simulations**[1] MARIA ELENA INNOCENTI, KULeuven (University of Leuven), Leuven, Belgium, STEFANO MARKIDIS, KTH Royal Institute of Technology, Stockholm, Sweden, GIOVANNI LAPENTA, KULeuven (University of Leuven), Leuven, Belgium — The Multi Level Multi Domain (MLMD) method (Innocenti (2013), Beck (2014)) is a fully kinetic, semi-implicit PIC method which simulates a domain as a collection of sub-domains where increasingly higher resolution is used. The aim is to reduce the computational costs of PIC simulations: simulations which are computationally challenging even with a traditional semi-implicit PIC code, e.g., realistic mass ratio simulations, become feasible with moderate computational resources. We present two sets of realistic mass ratio simulations: magnetic reconnection and Lower Hybrid Drift Instability (LHDI). MLMD reconnection simulations are discussed in Innocenti (2015). In the MLMD LHDI simulations, we show how the MLMD method cheaply extends the range of simulatedwavenumbers with respect to traditional simulations. We simulate the three LHDI stages (fast and slow LHDI branch, kink instability), which are well separated in wavenumber at realistic mass ratio. The coupling observed by Norgren (2012) between the magnetic field and perpendicular electric field LHDI oscillations in the magnetotail is investigated in these different stages.

[1]NERSC, Contract N. DE-AC02-05CH11231, PRACE SuperMUC, contract N. 2013091928, FWO, grant N. 12O5215N.

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Date submitted: 22 Jul 2015 Electronic form version 1.4