Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Design and development of a multi-architecture, fully implicit, charge and energy conserving particle-in-cell framework JOSHUA PAYNE, DANA KNOLL, ALLEN MCPHERSON, WILLIAM TAITANO, LUIS CHACON, GUANGYE CHEN, SCOTT PAKIN, Los Alamos National Laboratory — As computer architectures become increasingly heterogeneous the need for algorithms and applications that can utilize these new architectures grows more pressing. CoCoPIC is a fully implicit charge and energy conserving particle-in-cell framework developed as part of the Computational Co-Design for Multi-Scale Applications in the Natural Sciences (CoCoMANS) project at Los Alamos National Laboratory. CoCoMANS is a multi-disciplinary computational co-design effort with the goal of developing new algorithms for emerging architectures using multi-scale applications. This poster will present the co-design process evolved within CoCoMANS, and details regarding the design and development of multi-architecture framework for a plasma application. This framework utilizes multiple abstraction layers in order to maximize code reuse between architectures, while providing low level abstractions to incorporate architecture specific operation optimizations such as vectorizations or hardware fused multiply-add. CoCoPIC's target problems include 1D3V slow shocks, and 2D3V magnetic island coalescence. Results of the multi-core development and optimization process will be presented.

Joshua Payne
Los Alamos National Laboratory

Date submitted: 12 Jul 2013 Electronic form version 1.4