

Abstract Submitted
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OSIRIS: A Highly Scalable High-Performance Computing Application for Plasma Physics RICARDO FONSECA, Instituto Superior Técnico — The OSIRIS [1] Electromagnetic particle-in-cell (EM-PIC) code is widely used in the numerical modeling of many kinetic plasma laboratory and astrophysical scenarios. Working at the most fundamental microscopic level and needing to resolve the smallest spatial and temporal scales, these are the most compute-intensive models in plasma physics, requiring efficient use of large scale HPC systems. Exascale computing opens the opportunity for ab initio full-scale modeling of many relevant kinetic plasma scenarios, allowing the code to address an increasingly wider range of problems. In this presentation I will discuss our efforts on deploying OSIRIS doing computation in these advanced architectures, focusing on the latest trends and emerging technologies. I will address our implementation of a tile-based dynamic load balancing algorithm, and the support for the latest hardware (GPU architectures / ARM / Xeon Phi accelerators). Finally, I will report on recent scalability tests done at the Cori system, showing excellent weak and strong parallel scalability at full system scale.

[1] R. A. Fonseca et al., Lecture Notes in Computer Science 2331, 342-351 (2002)

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