

OSIRIS: A highly scalable kinetic plasma simulation platform

Friday, 31 January 2020 11:00 (25 minutes)

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 HEDS scenarios, allowing the code to address an increasingly wider range of problems. In this presentation, I will discuss our efforts on deploying OSIRIS for doing computation in these advanced architectures, focusing on the latest trends and emerging technologies. I will present the recent developments in the framework, in terms of new algorithms and physics models introduced for dealing with the extreme scenarios and requirements HEDS kinetic modeling. I will conclude by presenting our recent full-scale simulations of the AWAKE experiment at CERN, focusing both on the results and on the computational challenges.

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

Primary author: Prof. FONSECA, Ricardo (Instituto Superior Técnico)

Presenter: Prof. FONSECA, Ricardo (Instituto Superior Técnico)

Session Classification: Special Session on PIC Simulations II