BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Institute for Astrophysical Research

2023—2024 ASTROPHYSICS SEMINAR SERIES

The Physics of Plasma Jets and Cosmic Ray Acceleration: A Particle-in-Cell simulation perspective

The acceleration of cosmic rays (CRs) is a complex and dynamic phenomenon that plays a crucial role in shaping the high-energy universe. Shock acceleration and magnetic reconnection mechanisms, are thought to be responsible for the acceleration of CRs. Potential accelerators such as relativistic astrophysical jets, are common in systems like Active Galactic Nuclei and potentially Gamma Ray Bursts. Particle-in-Cell (PIC) simulation models have been essential for nearly two decades in studying these exciting jets. These simulation models give us insights about complex plasma interactions involving twisted magnetic fields, instabilities, turbulence, shocks, particle acceleration, and non-thermal radiation. In this presentation I will give an overview of the physics of plasma jets and cosmic ray acceleration mechanisms. I will then focus on recent PIC simulation studies and I will discuss how magnetic fields and kinetic instabilities in astrophysical relativistic jets affect particle acceleration.

Monday, March 25th

3:30 - 4:30 p.m.

CAS 502

Athina Meli

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