

UCLA Department of Physics & Astronomy

COLLOQUIUM

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Laboratory Astrophysics with Laser-Driven Plasmas

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Magnetized collisionless shocks and magnetic reconnection are two fundamental plasma processes for converting kinetic and magnetic energy into heat and highly-energized particles in astrophysical systems. These processes are observed throughout the cosmos, from coronal mass ejections and Earth's magnetosphere to supernova remnants and active galactic nuclei. While shocks and reconnection have been studied for decades by spacecraft, telescopes, and numerical simulations, there still remain key fundamental questions about the physics that govern these processes. Recent advances in high-energy lasers have allowed experimentalists to begin simulating astrophysically-relevant phenomena in the laboratory using laser-driven plasmas, opening a new domain for understanding plasma astrophysics. In this talk, I will discuss results from ongoing experimental campaigns and associated numerical simulations to study magnetized shocks and magnetic reconnection, leveraging a range of experimental facilities from the Large Plasma Device at UCLA to the largest laser systems in the world. I will also discuss how these experimental platforms can complement spacecraft and telescope observations and allow novel investigations of energy conversion in astrophysical plasmas.