

The UCLA logo is displayed in white text on a black rectangular background. The background of the entire slide features a vibrant green and blue plasma-like pattern with swirling, ethereal light effects.

Plasma Physics Seminar

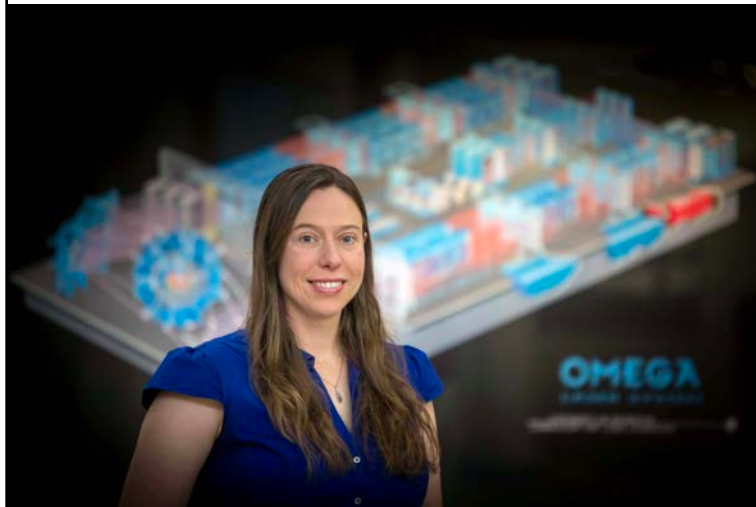
Physics & Astronomy Building (PAB) Room 4-330

Via Zoom: <https://ucla.zoom.us/j/92785449357?pwd=SVBTSko3bTdEUW03dzQwNks1Q2lKZz09>

Friday February 14th at 12:30PM

Lunch will be served at 12:00PM

Path to a Flying-Focus-Driven Laser-Plasma Accelerator for Single-Stage 100-GeV-Class Electron Beams on NSF OPAL



Jessica Shaw (University of Rochester)

High-Energy Physics colliders provide a window into the basic building blocks of the universe. As the energy gain from conventional radiofrequency accelerator technology begins to plateau, advanced accelerator concepts become the only way to push particle energies to new levels where the boundaries in the understanding of the universe can be expanded. Dephasingless laser wakefield acceleration (LWFA) driven by an achromatic flying focus is an original concept that is a disruptive technology with the potential to transform the field of laser-plasma acceleration (LPA) and more broadly advanced accelerators. Conventional LWFA approaches can accelerate electrons to high energies, but the maximum energy is constrained by the low plasma densities required to limit dephasing between the laser pulse and accelerated electrons. The achromatic flying focus is a new spatiotemporal focusing system that provides the ability to propagate a high-intensity laser pulse over meters at any velocity while maintaining a small focal spot and a near-transform-limited pulse duration. By controlling the velocity of a focal spot propagating in a plasma, a wakefield can be driven at the speed of light, thus eliminating dephasing. Initial simulations of this “dephasingless” LWFA with no dephasing between the laser pulse and accelerated electrons suggests that a 20 fs, 500 J laser (NSF OPAL) would be capable of accelerating electrons to 100-GeV-class energies in a one-meter stage. This flagship experiment seeks to successfully demonstrate such a 100-GeV-class LPA.