UCLA

# Plasma Physics Seminar

Physics & Astronomy Building (PAB) Room 4-330
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## Extreme plasma dynamics in intense laser fields


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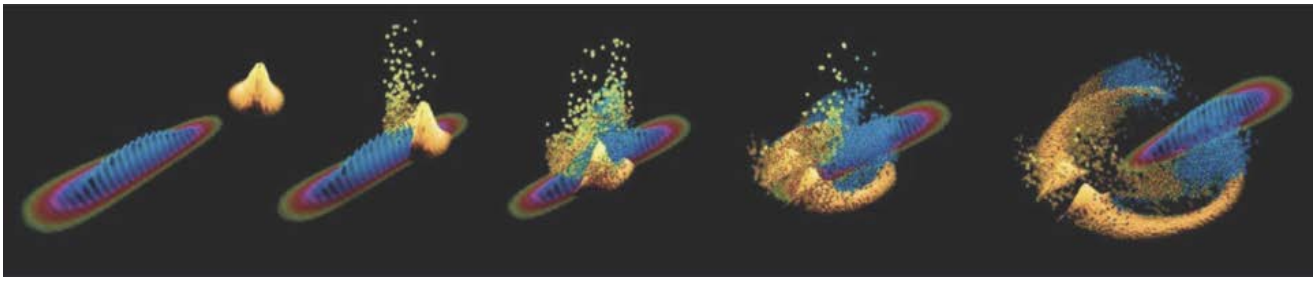
The next generation of lasers will access intensities above 10^23 W/cm^2. When plasmas or relativistic electron beams interact with these lasers, energy loss due to radiation emission, or quantum effects such as electron-positron pair creation become important for their dynamics. Repeated occurrence of pair creation can induce a so-called “QED cascade” that generates an exponentially rising number of particles. This allows for creating exotic plasmas that are a mix of electrons, ions, positrons, energetic photons and intense background fields. I will introduce a QED module coupled with the particle-in-cell framework OSIRIS that allows studying nonlinear plasma dynamics in the transition from the classical to the quantum-dominated regime of interaction. Studies relevant for (near) future experiments will be discussed.

*In this figure, a 10 PW laser is colliding with a 1 GeV electron beam and creates pairs.*

Marija Vranic obtained her MSc degree from University of Belgrade, Serbia and her PhD at Instituto Superior Tecnico in Lisbon, Portugal. After her PhD, she was working in Extreme Light Infrastructure in Prague, Czech Republic, and then returned to Portugal winning a Post-Doc fellowship from the National Foundation for Science and Technology. Her research is focused on plasmas in extreme conditions, where quantum effects can affect the collective plasma dynamics. She combines analytical theory and massively parallel computer simulations to perform the studies relevant for state-of-the-art and near-future laser experiments using the most intense lasers in the world. She is a winner of the John Dawson PhD thesis prize and the IBM Scientific Prize.