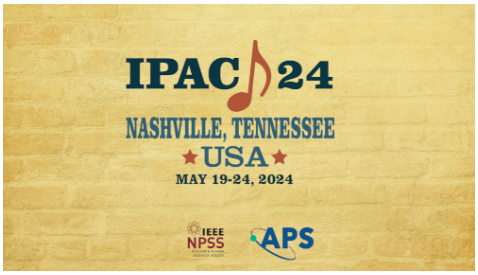

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Design and modeling of HOFI plasma channels for laser plasma accelerators

Monday, 20 May 2024 16:00 (2 hours)

Structured plasma channels are an essential technology for driving high-gradient, plasma-based acceleration and control of electron and positron beams for advanced concepts accelerators. Laser and gas technologies can permit the generation of long plasma columns known as hydrodynamic, optically-field-ionized (HOFI) channels, which feature low on-axis densities and steep walls. By carefully selecting the background gas and laser properties, one can generate narrow, tunable plasma channels for guiding high intensity laser pulses. We present on the development of 1D and 2D simulations of HOFI channels using the FLASH code, a publicly available radiation hydrodynamics code with specific improvements to model plasma channels. We explore sensitivities of the channel evolution to laser profile, intensity, and background gas conditions. We examine efforts to benchmark these simulations against experimental measurements of plasma channels. Lastly, we discuss ongoing work to couple these tools to community PIC models to capture variations in initial conditions and subsequent coupling for laser wakefield accelerator applications.

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