



Start-to-End Simulations of Laser- and Beam-driven Plasma Wakefield Accelerators and Light Sources

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The acceleration of high quality particle bunches to GeV energies has been experimentally demonstrated in plasma wakefield accelerators, using either strong laser pulses (LWFA) or highly relativistic particle beams (PWFA) as wakefield drivers. However, the quality of the bunches has not yet been comparable to what is reached in ordinary RF-based accelerators, making it challenging to apply plasma accelerators to end-use applications like free electron lasers (FEL). The underdense photocathode injection method (Trojan Horse method) in PWFA promises to produce high quality electron bunches capable of running (for example) FELs. The Trojan Horse method introduces the need for a highly relativistic electron beam itself, and currently the only facility that provides sufficient high charge and energy drive beams is FACET. To overcome this lack of suitable drivers, the use of a laser wakefield accelerator is promising. The production and acceleration of the witness bunch in the PWFA stage is stable under variation of the drive beam quality to a certain extent. Additionally, the requirements on the quality of the LWFA output are significantly reduced compared to end applications like FELs.

TODAY

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11am

**CIPS Stern Conference Room, Gamow Tower F931
Refreshments 10:45 Room F935**