

A laser plasma wakefield electron accelerator for the Advanced Photon Source and Low-Energy Accelerator Facility

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Recent developments in laser wakefield accelerators (LWFAs) lead us to consider employing this technology to accelerate electrons at the Advanced Photon Source (APS) facility. Previous experiments using LWFAs were performed at Argonne using the Terawatt Ultrafast High Field Facility. The injector complex serving the APS begins with an electron linac, producing beam energies on the order of 450 MeV. We consider that the infrastructure developed at the Linac Extension Area (LEA) could be usefully employed to develop a new LWFA injector for the APS linac. In the present work, we outline the proposed parameters of an LWFA using approximately a 100-TW-peak laser pulse focussed into a few-mm in extent pulsed gas jet. We are targeting electron beam energies in the range 300–500 MeV. Initially, we would use the LEA quads, diagnostics and electron spectrometer to demonstrate performance and characterize the LWFA beam, before moving the LWFA to inject into the Particle Accumulator Ring (PAR).

Footnotes

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