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Undepleted direct laser acceleration

Thursday 21 March 2024 16:40 (20 minutes)

In direct laser acceleration (DLA) of electrons, the leading part of the laser pulse ionizes the target material and forms a positively charged ion plasma channel into which electrons are injected and accelerated.
I will describe our recent work **[Cohen, I., et. al, Science advances, 10(2), eadk1947(2024)]** which shows that for efficient DLA to prevail, target materials of sufficiently high atomic number maintain the injection of ionization electrons at the peak intensity of the pulse.
Using the 20 TW laser system at Tel-Aviv University, we generated electron beams from plasma plumes created by pre-exploding foils of Au and CH. The plume's density was tailored by setting the pre-pulse energy and the pre-pulse to main-pulse delay to optimize the generated electron beam charge and energy. A new analytical solution to the plasma equations **[Cohen I, et. al, Phys. Plasmas 31 (1):013103 (2024)]** was used to describe the temporal evolution of the plume's density profile. PIC simulations revealed highly efficient acceleration of electrons injected from a specific range of ionization levels into the DLA channel.
I will conclude by describing an upcoming beam-time at ELI-Beamlines in which this new understanding will be employed to generate copious amounts of photoneutrons.

Available for oral presentation in a session

Yes

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