ID contributo: **369** Tipo: **Invited talk**

Advancement in plasma sources towards high repetition rate operation

lunedì 18 settembre 2023 11:00 (30 minuti)

Laser wakefield electron acceleration has attracted significant attention over the last decades, due to its ability to generate acceleration gradients orders of magnitude greater than those in conventional accelerators. However, in order to realise a multi-GeV laser-driven plasma accelerator stage, the laser pulse must remain focussed through tens of centimetres of low-density plasma. Such lengths are orders of magnitude greater than the Rayleigh range, and some form of wave-guiding is required. Particularly promising are hydrodynamic optical-field-ionized (HOFI) plasma channels, where a plasma channel is formed by the hydrodynamic expansion of a plasma column formed by OFI.

Thanks to their free-standing nature, HOFI channels appear as a suitable option for the high-repetition rate operation of future multi-GeV plasma accelerator stages. We present experimental results demonstrating that HOFI channels can be stably generated at kHz-scale pulse repetition rates. Further, we experimentally demonstrate the stable generation of HOFI channels at a mean pulse repetition rate of 0.4kHz for a period of 6.5hours without degradation of the channel properties due to the effects of heating or damage to the laser optics. These developments, in combination with novel schemes such as Plasma-Modulated Plasma Accelerator (P-MoPA), open a viable route towards an all-optical, high-repetition-rate accelerator stages.

Autori principali: Dr. ALEJO, Aaron (IGFAE, USC); COWLEY, James (John Adams Institute for Accelerator Science and Department of Physics); PICKSLEY, Alex (Lawrence Berkeley National Laboratory); WALCZAK, Roman (John Adams Institute for Accelerator Science and Department of Physics); HOOKER, Simon (John Adams Institute for Accelerator Science and Department of Physics)

Relatore: Dr. ALEJO, Aaron (IGFAE, USC)

Classifica Sessioni: Plenary session

Classificazione della track: Invited