



Contribution ID: 28

Type: talk

New concept of light ion acceleration from low-density target

Wednesday, 27 September 2017 17:15 (15 minutes)

In this talk we discuss further development of the recently proposed concept of proton synchronized acceleration by slow light (SASL) from low-density targets by powerful laser pulses [Brantov et.al, Phys.Rev.Lett. 116, 085004 (2016)]. The key point of SASL is the capability for the laser pulse first to slow and then to increase its group velocity monotonically inside a target. Ions are accelerated by laser ponderomotive electric sheath, which propagates in the plasma with the same group velocity as a laser pulse. The monotonic increase of the pulse group velocity makes ions achieve a synchronized acceleration in this sheath. Based on 3D PIC simulations we compare the features of ion acceleration by linearly and circularly polarized laser pulses from thin foils and low-density targets to show advantage of SASL mechanism. The discussion of advances of circularly polarized laser pulses for ion acceleration is addressed in details.

This work was supported by the Russian Science Foundation (Grant # 17-12-01283).

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Session Classification: WG2_Parallel

Track Classification: WG2 - Ion Beams from Plasmas