



Contribution ID: 61

Type: **talk**

Optimized matching strategy for laser driven plasma boosters

Tuesday, September 15, 2015 6:00 PM (30 minutes)

Plasma accelerated beams possess peculiar properties that make them quite different from beams accelerated by conventional means. Rather large energy spreads and divergences (with relativistic transverse momenta) are among such properties. In order to be fruitfully produced and employed, for example for driving cutting edge electromagnetic radiation sources, a careful manipulation is needed, especially when a beam produced by conventional technology is boosted by plasma. An issue of paramount importance is attaining a reasonable matching when a beam enters a stage of plasma acceleration and, on the other hand, a strategy for reducing their high divergence at plasma exit is needed. Both operations should allow to preserve beam properties, such as brightness.

In this work we investigate a matching procedure by numerical simulations and optimize the parameters for the planned External Injection experiment at the SPARC_LAB facility.

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Session Classification: WG1 - Electron beams from plasmas

Track Classification: WG1 - Electron beams from plasmas