



Contribution ID: 238

Type: talk

Laser-driven Dielectric Wakefield Accelerator

Thursday, 28 September 2017 16:20 (20 minutes)

A new concept in laser-driven high field acceleration is proposed in which a laser is used to excite, by optical rectification in a nonlinear medium, a series of resonant THz cavities. This second order process entails a mode conversion from optical-IR to THz radiation that is analogous to ponderomotive excitation of plasma waves in the laser wakefield accelerator. With a laser pulse train, it is foreseen to reach GV/m-class fields with this method. We present electromagnetic simulations including the optical rectification process that show the performance of an example system. Practical issues associated with experimental proof-of-principle are discussed.

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Session Classification: WG3_Parallel

Track Classification: WG3 - Electron Beams from Electromagnetic Structures, Including Dielectric and Laser-driven Structures