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Laser-driven Dielectric Wakefield Accelerator

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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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