Abstract Submitted
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Laser Pulse Driven Terahertz Generation via Resonant Transition Radiation (RTR) in inhomogeneous Plasmas[1] CHENLONG MIAO, Univ of Maryland, JOHN PALASTRO, Icarus Research, Bethesda, Maryland, THOMAS ANTONSEN, Univ of Maryland — Intense, short laser pulses propagating through inhomogeneous plasma can ponderomotively drive THz radiation via a resonant transition radiation mechanism (RTR) for THz generation as the laser pulses cross a plasma boundary [1]. Simulations and theoretical analysis demonstrate that the THz emission is low frequency, broad band, coherent and conical. Simulation results show that this radiation is insensitive to the plasma length and density above $1.5\text{x}10^{18}$ cm^{-3} for the laser parameters we use and assuming a sharp plasma boundary. The effect of density ramps [2] is also considered and shown that an upward ramp enhances the radiated energy while a downward ramp diminishes it. According to the model we developed, the radiation at a given frequency is generated at the resonant point in the plasma ramp where its frequency matches the local plasma frequency. The radiation must then tunnel out of the plasma to the turning point. The results from our model matches well with the simulation using the full format PIC code TurboWAVE, showing that the amount of radiation reaches maximum at a certain ramp length. As an example, a fixed driver pulse (1.66 J) excites THz radiation of 280.7 μJ in a 400 μm increasing density ramp. [1] L. M. Gorbunov et. al., Plasmas Physics Reports Vol. 32, No. 10 (2006). [2] C. Miao, Proceedings of 6^{th} IPAC, JACoW, in press (2015).

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