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Generation of Relativistic THz Radiation by Laser Irradiation of Microplasma Waveguide with Application to Pulsed Polarimetry[1] ALES NECAS[2], ROGER SMITH, TAE Technologies, LONGQING YI, Chalmer University, TAE TECHNOLOGIES TEAM — Generation of relativistic pulses in the terahertz range and its application to pulsed polarimetry is proposed. Irradiation of a microplasma waveguide (MPW) with a relativistic (a0>1) p-polarized sub-pico second laser results in a high-charge (10s nC) electron bunches with energies up to 100 MeV. As an electron bunch exits the MPW its energy is converted to THz radiation through coherent diffraction radiation. Particle-in-cell (PIC) simulation is used to demonstrate the generation of the electron bunches by laser irradiation of a plasma at grazing and oblique incidences to a sharp plasma-vacuum boundary. The spacing of the electron bunches is roughly one laser wavelength. We shall discuss the various competing mechanism facilitating their generation: direct laser transverse field driver, ponderomotive force, counter streaming (return current) electrons in the plasma. Moreover, we shall demonstrate the THz radiation generation by performing spectral analysis of the exiting radiation. 2D PIC simulation shall be used to optimize the MPW shape and laser properties to maximize the outgoing THz radiation. Lastly, we shall discuss how the THz radiation is applicable to pulsed polarimetry to enable the measurement of internal magnetic field.

[1]TAE Technologies Investors
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