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Characteristics of THz emission from a femtosecond-laser produced dense plasma NOBORU YUGAMI, KENICHI NINOMIYA, TOMONOBU SAITO, KUN LI, TAKESHI HIGAHIGUCHI, Utsunomiya University — Recently, the THz radiation from a femtosecond-laser-produced dense plasma have been studied. The short electromagnetic pulse in THz spectral region emits by the interaction between a laser wakefield in a static magnetic field. The magnetized wakefield has both electrostatic and electromagnetic components, and has nonzero group velocity. This enables the wake to propagate through the plasma and couples radiation into the vacuum. This phenomenon is called the Cherenkov wake radiation, and the emitted frequency is expected to be close to the plasma frequency. The theory predicts the production of GHz to THz radiation at a power approaching GW level by using the wakefield excited by current laser systems and the appropriate magnetic field. We demonstrated a proof-of-principle experiment of a Cherenkov wake radiation from the femtosecond-laser-produced magnetized wakefield. A maximum frequency up to 0.3 THz with a pulse width of 200 ps (FWHM) was observed. In addition, we also observed an angular distribution of the radiation, which has an annular cone profile at far-field attributed TM_{01} mode in a plasma. In addition, we also show the development of an electro-optic (EO) sampling system for detecting coherent THz emission from a laser-produced dense plasma.

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