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Elliptically polarized THz radiation from laser plasma driven by few-cycle laser pulses

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The intense carrier-envelope phase (CEP) stabilized few-cycle (< 1.5 cycles) circularly polarized pulses are generated at the center wavelength of 1.8 μm. By changing the polarization state of the home-built optical parameter amplifier output beams to be circular, the spectrum is expanded to supercontinuum (1300nm-2100nm) with an extremely high transmittance (> 65%). Elliptically polarized terahertz (THz) waves are generated from air plasma induced by the circularly polarized few-cycle laser pulses. Experimental and calculated results reveal that electric field asymmetry in rotating directions of the circularly polarized few-cycle laser pulses produces the enhanced broadband transient currents, and the phase difference of perpendicular laser field components is partially inherited in the generation process of THz emission. The ellipticity of the THz emission and its major axis direction are optically controlled by the duration and CEP of the laser pulses.

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