Abstract Submitted
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Angular-distribution measurements of nonlinear, relativistic Thomson scattering[1] CALVIN HE, University of Maryland, College Park, ANDREW LONGMAN, University of Alberta, JOSE PEREZ-HERNNDEZ, JON APIANIZ, MASSIMO DE MARCO, GIANCARLO GATTI, LUIS ROSO, Centro de Lseres Pulsados, ROBERT FEDOSEJEVS, University of Alberta, WENDELL HILL, III, University of Maryland, College Park — At relativistic laser intensities ($I > 10^{18}$ W/cm^2) Thompson scattering becomes nonlinear, leading to emission of light deviating markedly from the nonrelativisitc regime. The relativistic motion of free electrons induces new dynamics, which manifest themselves in wavelength and angular shifts as well as harmonics that are intimately coupled with the intensity. Sarachik and Schappert [Phys. Rev. D 1 (1970)] showed the Doppler shifts of Relativistic Thomson Scattering (RTS) to be proportional to $I(1 - \cos\theta)$, where θ is the observation angle relative to the laser propagation direction. Recently, Harvey [Phys. Rev. Accel. Beams 21 (2018)] explored more throughly the relationship between the angular distribution and the intensity theoretically. Both RTS features are calculable classically, making comparison with measurement straightforward. Previously, we showed the classical treatment of the Doppler shift to be in good agreement with measurement between 10^{18} and 10^{19} W/cm^2 at $\theta = 90^\circ$ [Optics Express 27, 30020]. In this presentation we will discuss our angular-distribution measurements between 30° and 130° in the 450 to 700 nm range for $I \sim 10^{18}$ to 10^{19} W/cm^2, and how they compare with numerical simulations.

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