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200-WORD ABSTRACT

Experiments on Ultrashort, Ultraintense Laser Interaction with Thin Foils

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We have performed a series of experiments at the Laboratoire d'Optique Appliquée in which intense fs pulses of a Ti:Sa laser where focused on a thin plastic foil at an intensity up to 10^{20}W/cm^2. In these experiments the laser field at the focal position is confined in a wave-packet as short as 10 μm (≈ 10 cycles pulse) and less than 10 μm in width. In such conditions the electrons of the target experience electric fields exceeding by orders of magnitude the atomic fields.

Optical, X-ray and gamma-ray techniques implemented to investigate this interaction regime show that the dynamics of the interaction depends strongly upon the intensity of the amplified spontaneous emission (ASE), namely the nanosecond pulse preceeding the main femtosecond pulse.If the intensity of the prepulse is below the plasma formation threshold, the femtosecond pulse interacts directly with a thin, dense, sharply-bounded layer. In contrast, in the presence of an intense ASE, premature explosion of the foil occurs and the femtosecond pulse propagates through a preformed large scalelength plasma. Novel observations and measurements performed recently will be presented and discussed.

35-WORD SUMMARY

Recent experimental results will be presented on the interaction of intense femtosecond pulses with thin targets in which the effect of premature plasma formation on hard X-ray emission and fast electron generation is investigated.