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Short Laser Pulse Absorption in Dense Inhomogeneous Plasmas

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Short laser pulse absorption in solid density targets has been measured recently over a wide range of laser intensities [1]. We have developed an approximate model of the laser pulse interaction with inhomogeneous solid density targets. First, this model is solved in the 1D geometry of normal incidence for moderate laser intensities and collisional absorption. Scaling of these results with the density gradient and laser intensity have been found and compared with the Vlasov-Fokker-Planck simulations using the new version of the code KALOS [2]. The unique features of KALOS make possible simultaneous investigations of laser energy absorption at the target surface and the transport of heat into the dense target. Next our numerical and theoretical studies have been extended into the collisionless regime of laser absorption and high laser intensities up to 1018 W/cm2. Absorption by relativistic electron generation, the role of plasma waves produced by bunched relativistic electrons and surface target heating have been studied and elucidated by theoretical models. [1] Y. Ping, et al. Phys. Rev. Lett. 100, 085004 (2008). [2] A.R. Bell, et al. Plasma Phys. Control. Fusion 48, R37 (2006).

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