INTENSE LASER–SOLID INTERACTION: ABSORPTION AT HIGH LASER INTENSITY CONTRAST

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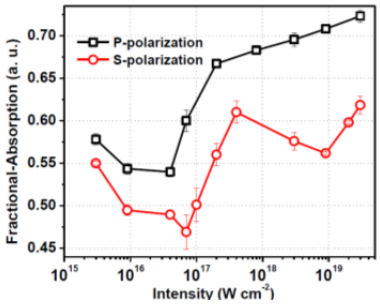
Absorption of laser pulses is the fundamental step in high intensity laser-matter interaction studies. It is however, an issue that is attracting renewed interest because of the emergence of femtosecond pulses with ultrahigh intensity contrast at the few picosecond scale and remains a widely open question given the variations in target and laser pulse structures and the fact that there are very few direct measurements of the level of absorption. Here we present detailed measurements on the absorption process using an array of diagnostics – direct calorimetry, fast electron spectra, fast electron angular distribution and Doppler shift of the generated second harmonic. We use intense, 30 femtosecond laser pulses and simple (model) solid targets. The study, performed under contrast varying over four orders of magnitude and laser intensity reveals a significant and non-intuitive dependence on these parameters. Furthermore, for the highest contrast of 10^{-9} and at the highest intensity of $2x10^{19}$ Wcm^{-2}, these observations point towards the role of **JxB** mechanism for high absorption at relativistic intensity. The experimental results are strongly supported by 2D particle in cell simulations.



[1] P.K. Singh *et.al.* (submitted)

[2] P.K. Singh, PhD Thesis, Tata Institute of Fundamental Research, Mumbai, 2014