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Propagation of Laser-Driven Relativistic Electron Beam inside Solid Dielectric G.S. SARKISOV, D. JOBE, R. SPIELMAN, Raytheon Ktech, V.V. IVANOV, P. LEBLANC, Y. SENTOKU, K. YATES, P. WIEWIOR, UNR, V.YU. BYCHENKOV, Lebedev Physics Institute, Moscow — Laser probing diagnostics shadowgraphy, interferometry and polarimetry was used for comprehensive characterization of ionization wave dynamics inside glass target induced by laser-driven relativistic electron beam. Experiment was done using 50-TW Leopard laser at University of Nevada Reno. It has been shown that for laser flax $\sim 2\times10^{18}$W/cm^2 hemispheric ionization wave propagates with c/3 speed has smooth electron density distribution, absorbing probing green beam in 2-10 times. Maximum of free-electron density inside glass target is $\sim$2x10^{19}cm^{-3}, which correspond to ionization $\sim$0.1%. Magnetic and electric fields do not exceed $\sim$15 kG and $\sim$1 MV/cm. Electron temperature has hot-ring structure with maximum 0.1-0.5 eV. The topology of the interference phase shift shows the signature of the "fountain effect", a narrow electron beam that fans out from the propagation axis and heads back to the target surface. Two-dimensional PIC-simulations demonstrate radial spreading of fast electrons by self-consistent electrostatic fields. The very low ionization, $\sim$0.1%, observed after the heating pulse suggests a fast recombination at the sub-ps time scale. Work was supported by the DOE/NNSA under UNR grant DE-FC52-06NA27616 and grant DE-PS02-08ER08-16.

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