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Experimental study of transport of relativistic electron beams in strong magnetic mirror field[1] SHOHEI SAKATA, Institute of Laser Engineering, Osaka University, KOTARO KONDO, Research Laboratory for Nuclear Reactors, Tokyo Institute of Technology, MATHIU BAILLY-GRANDVAUX, CLAUDIO BELLEI, JOAO SANTOS, CELIA, University of Bordeaux, FIREX PROJECT TEAM — Relativistic electron beams REB produced by ultra high intense laser pulses have generally a large divergence angle that results in degradation of energy coupling between the REB and a fuel core in the fast ignition scheme. Guiding and focusing of the REB by a strong external magnetic field was proposed to achieve high efficiency. We investigated REB transport through 50 μm or 250 μm thick plastic foils CuI doped under external magnetic fields, in magnetic mirror configurations of 1.2 or 4 mirror ratio. The experiment was carried out at the GEKKO XII and LFEX laser facility. Spatial pattern of the REB was measured by coherent transition radiation and/or Cu Ka x ray emission from the rear surface of the foil targets. Strong collimation of the REB by the external magnetic field was observed with 50 μm thick plastic targets, while the REB scattered in 250 μm thick targets. The experimental results are compared with computer simulations to understand the physical mechanisms of the REB transport in the external magnetic field.

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