Development of laser driven kilo-Tesla magnetic field generator in micron scale

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Nowadays investigation on relativistic magnetic reconnection is attaching large attention. Some of the proposals [1] for its experimental realization is relativistic intensity laser-target interaction. In our research we propose relativistic laser driven micron scale strong (10^7 G) magnetic field generator for future magnetic reconnection experiments and investigate its parameters. Generator consist of Cu wire (1600 μm in length, 100 μm in width) attached to the rear side of Al foil. It was heated by high intensity LFEX laser with pulse duration was ~1.5 ps, the estimated peak intensity was up to 10^{19} W/cm^2. To detect wire plasma parameters X-ray spectra were measured by focusing spectrometer with spatial resolution (FSSR) from both front and rear side of the target. Using advanced three zone kinetic modeling [2] of spectra electron temperature, electron density and ionization state were evaluated. At the same time image of the proton, accelerated from Al foil [3] was obtained. This image involves information about spatial distribution of magnetic and electric field inducted around the wire.

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