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A direct evidence of magnetic field induced lateral transport of fast electrons[1] PRASHANT KUMAR SINGH, GOURAB CHATTERJEE, AMITAVA ADAK, AMIT D. LAD, SAIMA AHMED, RAVINDRA KUMAR GATTAMRAJU, Tata Institute of Fundamental Research, Colaba, Mumbai, India — Fast electrons generated in the interaction of intense ultrashort laser pulses with solid targets have important roles in both fundamental physics and in technological application such as fast ignition fusion. A fast electron beam propagating into the cold target excites strong self-generated electric and magnetic fields, which in turn govern the transport of the beam itself. These strong fields can deviate the fast electrons propagating into the target and can confine them along the target surface. We observe an ultrafast surface ionization wave from the reflectivity signal driven by the interaction of $3\times10^{17}Wcm^{-2}$ intense pulse with a glass target. The reflectivity signal is found to expand three times the initially photoexcited volume, driven by the lateral transport of fast electrons. A simultaneous measurement of the evolution of the generated megagauss magnetic field reveals the direct role of anomalous resistivity in governing the transport of the fast electrons. The similarity in the spatial extent of reflectivity and magnetic field signals indicate that the surface transport is induced by the magnetic field. The lateral transport of fast electrons is explained using a model of magnetic field diffusion.

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