Weibel instability in the laser plasma induced by ultrashort 250 TW laser pulse

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The Weibel instability is ubiquitous in nature, occurring in coronal ejections of stars [1], in the solar wind, as well as in laser ablation and plasma heating by powerful ultrashort laser pulses, for example, in Fast Ignition (FI) experiments. Weibel instability occurs in plasma with an anisotropic distribution function or in interpenetrating particle flows. Small-scale static magnetic fields are generated as a result of current filamentation and can reach the Megagauss level. The present work reports the results of experimental investigations of the Weibel instability in a plasma produced by irradiating a target by the 250-TW laser pulse from the PEARL laser facility. The peak intensity of the laser pulse reached $2 \times 10^{18} \frac{W}{cm^2}$. The small-scale electrical current instability was investigated using optical refractive, interferometery and Faraday rotation methods [2].

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