

Abstract Submitted
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Experimental exploration of the transition between the Biermann battery and Weibel instability magnetic field generation mechanisms in laser-driven plasmas G. D. SUTCLIFFE, P.J. ADRIAN, J. A. PEARCY, T. M. JOHNSON, J. A. FRENJE, M. GATU JOHNSON, F. H. SEGUIN, C. K. LI, R. D. PETRASSO, MIT — The generation and amplification of magnetic fields throughout the universe is currently not fully understood. The Biermann battery and Weibel instability are two mechanisms for magnetic field growth. In laser-generated plasmas, where there are large misaligned temperature and density gradients, the Biermann battery typically dominates other mechanisms. PIC simulations (Schoeffler *et al.* PRL 2014) showed that the Biermann battery gives way to the Weibel instability under the right conditions, which could be reached in a laser-generated plasma bubble expanding from a foil. Data from beam-on-foil experiments at OMEGA in the last few years have had hints of this transition to the Weibel instability. Characteristic Weibel filaments appear in the periphery of experiments with the appropriate conditions. We present this data in the context of understanding this Biermann-Weibel transition, as well as outline requirements for future experiments aimed at exploring the transition further. This work was supported in part by the U.S. DOE, NLUF and LLE.

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