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Experiments to Observe the Weibel Instability: The Origin of Gamma Ray Burst Afterglow[1] C.M. HUNTINGTON, T. MATSUOKA, C. MCGUFFY, A. MAKSIMCHUK, V. YANOVSKY, K. KRUSHELNICK, University of Michigan, T. KATSOULEAS, University of Southern California, M. MEDVEDEV, University of Kansas, L.O. SILVA, Instituto Superior Técnico, Portuagal, W.B. MORI, University of California Los Angeles, R. BINGHAM, Rutherford Appleton Laboratory, UK, R.P. DRAKE, University of Michigan — Recent theory suggest that the radiation signature of gamma ray burst afterglow may be the result of the interaction of ultrarelativistic electrons, ejected from supernova shocks, with small-scale magnetic fields. These tiny "tangled" magnetic fields are thought to be created by the two-stream filamentation instability, or Weibel Instability, of the beaming electrons. Using the Hercules laser facility at the University of Michigan, we are conducting an experiment to create an electron beam by the laser wakefield technique, produce such filaments by passing the electron beam through another plasma, and image the resulting structure. This experiment provides one of the first direct observations of Weibel filamentation in a relativistic electron beam.

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