Abstract Submitted
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Field compressing magneto-thermal instability in laser heated plasma[1] ROBERT KINGHAM, JOHN BISSELL, CHRISTOPHER RIDGERS, Imperial College London — We present a new instability in magnetized long scale-length plasmas heated by laser beams. It is active under conditions of recent nanosecond laser gas-jet experiments [1] - with collinear laser beam and applied B-field - designed to explore transport issues in magnetized laser-plasmas and in ICF, particularly hohlraum plasmas. The instability is driven by cross-field heat-flow out of the laser-heated column and leads to growth of large B-field and temperature perturbations (perpendicular to the field direction and bulk $.\nabla T$). Unstable behaviour results purely from transport processes - feedback between the Nernst effect and the Righi-Leduc heat-flow phenomena in particular - neither hydrodynamic motion nor density gradients are essential. The phenomena is distinct from other well known instabilities such as the Tidman-Shanny, Weibel and the MHD interchange instabilities. Calculations based on [1] predict a peak growth rate of order 10 ns^{-1} at wavelengths of order 50 μm, for a 6T field and n_e=1.5x10^{19} cm^{-3}. The strong modulation in the B-field strength affects the spread of thermal energy from the heated region.

[1] D. Froula, *et al.*, PRL **98** (135001) 2007

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