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High resolution studies of MHD instabilities in magnetic anvil cells PIERRE-ALEXANDRE GOURDAIN, MARISSA ADAMS, MATT EVANS, HANNAH HASSON, IMANI WEST-ABDALLAH, JAMES YOUNG, GILBERT COLLINS, University of Rochester, SIEGFRIED GLENZER, Stanford University —
Magnetic anvil cells allow to reach relatively high material pressures (several Mbar) using modest pulsed-power drivers (1MA), providing that the current rise time is shorter than 300 ns and the compression is axially symmetric. The work presented here explores the degree of symmetry obtained from the isentropic compression of a uniform aluminum sample using the 3D extended MHD code PERSEUS. Simulations show that instabilities have little impact on the symmetry of the sample, providing that the sample is heavy enough to start with. While this geometry generates density and temperature gradients during compression, Abel inversion techniques can be used to recover the local mass density and temperature under axisymmetric conditions. But what about the pressure? The cylindrical symmetry has another major advantage. The measurement of the magnetic field at the edge of the sample at full compression allows to infer directly the pressure of the warm dense matter sample on axis. In this case, the magnetic anvil cell resembles its mechanical counterpart, the diamond anvil cell, where the force applied externally on the diamond is directly related to the pressure in the diamond cell gap.

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