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Demonstration of modified laser propagation in magnetized gas pipe experiments at the NIF BRADLEY POLLOCK, EVAN CARROLL, JONATHAN FRY, KEN PISTON, ARLEN ROWE, BRUNO LEGALLOUDEC, DAVID STROZZI, GRANT LOGAN, Lawrence Livermore Natl Lab, MICHAEL GLINSKY, MATTHEW WEISS, KYLE PETERSON, Sandia National Lab, JAMES WATSON, DOUG LARSON, MARK HERRMANN, JAMES ROSS, JOHN MOODY, Lawrence Livermore Natl Lab — Recent MagLIF gas pipe experiments at the NIF have demonstrated modification to the axial laser propagation characteristics in the presence of an externally applied axial magnetic field. The field is supplied by the new MagNIF pulsed power system, allowing the NIF to deliver up to 30 T fields in ˜cm^3 volumes. Initial measurements of plasma x-ray emission perpendicular to the gas pipe axis show that with a 12 T field, the ˜30 kJ laser pulse propagates through the 10 mm-long, 1 atm neopentane-filled gas pipe ˜2 ns more quickly than without a magnetic field. The morphology of the emission profile is also modified with the magnetic field, showing the hot column to be more cylindrical (than conical) with the magnetic field. These two effects both suggest that the field is reducing thermal transport in the plasma and increasing the electron temperature near the gas pipe axis, and the results are compared with Hydra simulations of the same conditions. Future experiments will measure electron temperature and density profiles with and without magnetic fields, as well as increase the field strength and the plasma density. This work was performed under the auspices of the U.S. Department of Energy by LLNL under Contract DE-AC52-07NA27344.

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