Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

**Scaling Laws for Plasma Jets-Driven Liner Implosions** J. CASSIBRY, S. THOMPSON, UAH, S. HSU, LANL, D. WITHERSPOON, HyperV —
Plasma jets driven magnetoinertial fusion (PJMIF) is a fusion energy concept which consists of an imploding plasma liner that shock heats and compresses a magnetized target plasma. The liner can be formed by the merging of a cylindrical or spherical distribution of plasma jets, which are launched by a salvo of plasma accelerators. Confinement of the target is inertial, with the thermal conduction suppressed by the magnetic field. Imploding plasma liners can also be an inexpensive path to creating high energy density (HED) plasmas in the laboratory with cm and $\mu$s spatial and temporal scales, respectively. In this poster, we use analytical and smoothed particle hydrodynamic (SPH) modeling to develop scaling relations for peak pressure and confinement time for liner collapse onto a cavity, and for select cases with an adiabatic target. The primary goal is to estimate the initial conditions required for plasma liners in reaching 0.1 to 1 Mbar pressure using imploding shocks. We will use SPH to study selected 1D to 3D cases, with the latter to include the formation of a liner from discrete jets. Scaling relations are developed for peak conditions as a function of the initial jet conditions, specifically the number of jets, thermodynamic properties, and dimensions. We also discuss possible PJMIF scenarios that may be capable of reaching interesting fusion gains (G $\sim$ 5–20).

J. Cassibry
UAH

Date submitted: 21 Jul 2008 Electronic form version 1.4