Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

A Research Program for Ion-Based Fast Ignition[1] JUAN C. FERNÁNDEZ, B.J. ALBRIGHT, K.A. FLIPPO, B.M. HEGELICH, M.S. MURILLO, M.T. PAFFETT, M.J. SCHMITT, R. K. SCHULZE, Los Alamos National Lab., S.A. SLUTZ, Sandia National Lab. — We present a research program to evaluate fast ignition (FI) lit by laser-driven ion beams heavier than protons. Compared to protons, heavier ions have the potential advantage of a more localized energy deposition, which might translate into a significantly lower total beam-energy requirement. The starting points for this research are the target-design requirements in the study by Temporal *et al.* [Phys. Plasmas 9 (2002) 3098] and the recent demonstration of the capability to produce laser-driven quasi-mono-energetic ion beams, at the Los Alamos Trident laser facility by Hegelich *et al.* [Nature, submitted (2005)]. Based on our present theoretical understanding of the plasma physics and of the target-surface physics involved, we outline the development of the capability to accelerate mono-energetic beams within the constraints of a fast-ignition target. We discuss experiments necessary to validate, in the FI regime, applicable theory and modeling in warm-dense matter and beam-dense plasma interactions. Ultimately, we apply those improved models and existing target-design capability to understand the tradeoffs associated with using different ion species in FI, to optimize the scheme, and to design FI proof-of-principle experiments in a facility such as Z-R and Z-Beamlet

[1]This work is supported by the LANL LDRD program.

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Date submitted: 27 Jul 2005 Electronic form version 1.4