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Ion-driven fast ignition – advantages and challenges BJOERN MANUEL HEGELICH, BRIAN J. ALBRIGHT, LIN YIN, JUAN C. FERNANDEZ, KIRK A. FLIPPO, LANL — Proton-driven fast ignition has been proposed as an alternate FI-scheme shortly after the discovery of high-current, high-energy laser-accelerated protons from the LLNL PW laser [1,2]. The demonstration of other laser-accelerated ion species [2], including mono-energetic light ions, has considerably increased the available parameter space in the search of the optimal FI-driver. The greatest disadvantage of any ion driver over the electron driver is the lower conversion efficiency of laser energy into *beam particle* energy. This disadvantage may however be offset by more favorable stopping and transport characteristics, tipping the ratio of laser energy to *deposited* energy in the fuel in favor of ion fast ignition. We will review these parameters, taking into account new results in laser-accelerated ions, target considerations and ion stopping in dense plasmas. We discuss how further progress can be made to exploit the advantages over electron fast ignition, such as increased stopping and stiffer beam characteristics. [1] M. Roth *et al.*, PRL **86** (2001) 436 [2] Temporal *et al.*, Phys. Plasmas **9** (2002) 3098 [3] Hegelich *et al.*, submitted to Nature (2005)

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