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Dynamics and MRT stability of axially pre-magnetized multi-shell, multi-species gas-puff Z-pinches[1] JEFF NARKIS, FABIO CONTI, Center for Energy Research, University of California, San Diego, HAFIZ RAHMAN, EMIL RUSKOV, PAUL NEY, Magneto-Inertial Fusion Technologies, Inc., FARHAT BEG, Center for Energy Research, University of California, San Diego — Gas-puff Z-pinch implosions onto a central column of target plasma are a well-known source of neutrons or X-rays, depending on the target material. [1] However, they are highly susceptible to the magneto-Rayleigh-Taylor instability, necessitating the use of one or more mitigation mechanisms, like axial premagnetization [2] and/or density profile tailoring [3,4]. Previous 2-D HYDRA simulations on a 160-ns, 800-kA LTD [5] demonstrated the stabilization of a 2.5-cm-radius Ne liner onto D target implosion with the addition of a second liner at radius 1.25 cm and B_{z0} of 0.2 T. Presented here is an extension of that work which considers the effects of radial and axial mass distribution, liner material (Ne, Ar, or Kr), and liner mixing (by prescribing an impurity fraction in the load) on peak target conditions and deuterium-deuterium neutron yield. [1] J. Giuliani and R. Commisso, IEEE Trans. Plasma Sci. **43**, 2385 (2015). [2] F. Beg et al, APS DPP 2018, http://meetings.aps.org/link/BAPS.2018.DPP.YO6.1. [3] A. L. Velikovich, F. L. Cochran, and J. Davis, Phys. Rev. Lett. **77**, 853 (1996). [4] H. Sze et al, Phys. Plasmas **14**, 056307 (2007). [5] J. Narkis, PhD thesis (University of California San Diego, 2019).

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