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**Laboratory Photoionization Fronts in Nitrogen Gas**[1] WILLIAM GRAY, PAUL KEITER, CODY PATTERSON, JOSHUA DAVIS, PAUL DRAKE, Univ of Michigan - Ann Arbor — Photoionization fronts play a dominant role in many astrophysical situations, but remain difficult to achieve in a laboratory experiment. We present the results from a computational parameter study evaluating the feasibility of the proposed laboratory experiments of Drake et.al (2016). The nitrogen gas density and the Planckian radiation temperature of the source that generates the x-ray flux, define each simulation. Computational simulations modeled experiments in which the x-ray flux is generated by a laser-heated gold foil, suitable for experiments using many kJ or of laser energy, and also experiments in which the flux is generated by a “z-pinch” device, which implodes a cylindrical shell of conducting wires. The models are run using crash, our block-adaptive-mesh code for multi-material radiation hydrodynamics. The radiative transfer model uses multi-group flux limited diffusion with thirty radiation groups. In addition, electron heat conduction is modeled using a single-group, flux-limited diffusion. In the theory, a photoionization front can exist only when the ratios of the electron recombination to the photoionization flux and the electron collisional ionization rate to the recombination rate lie in certain range .

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