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Laboratory Generated Photoionization Fronts Relevant to Cosmology[1] MICHAEL SPRINGSTEAD, HEATH LEFEVRE, Univ of Michigan - Ann Arbor, TAISUKE NAGAYAMA, GUILLAUME LOISEL, JAMES BAILEY, Sandia National Laboratory, SALLEE KLEIN, Univ of Michigan - Ann Arbor, ROBERTO MANCINI, KYLE SWANSON, Univ of Nevada - Reno, DON WINGET, BART DUNLAP, Univ of Texas - Austin, JOSHUA DAVIS, WILLIAM GRAY, CAROLYN KURANZ, PAUL DRAKE, Univ of Michigan - Ann Arbor — Photoionization Fronts (commonly referred to as Ionization Fronts or PI fronts) are a type of radiation-driven heat front that dictate important physics in reionization era of the early universe. The first galaxies of the reionization era merged to form minihalos. Subsequently, these minihalos emitted ionizing radiation to the surrounding gas clouds, which generated PI fronts. The asymmetric propagation and attenuation of a PI front within a gas cloud is an active area of study in the early universe cosmology. In the laboratory setting, the Z Astrophysical Plasma Properties (ZAPP) platform on Sandias Z-Machine facility is capable of generating an intense radiation source to drive a PI front through a 0.75atm nitrogen gas cell. To better understand upcoming ZAPP experiments on Sandias Z-Machine, this work presents an initial experimental design, accompanied by HELIOS radiation-hydrodynamic simulations, and PrismSPECT atomic kinetics calculations.

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