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kHz Ion Acceleration Under Variable Background Pressure¹ JOHN T. MORRISON, Innovative Scientific Solutions, Inc. (ISSI), S. FEISTER, FLASH Center, K. FRISCHE, ISSI, D.R. AUSTIN, The Ohio State University (OSU), G.K. NGIRMANG, OSU, A.C. PETERSON, University of Dayton Research Institute (UDRI) / OSU, J. SMITH, OSU, A. KLIM, UDRI, C. ORBAN, OSU, E.A. CHOWDHURY, Intense Energy Solutions, LLC., W.R. ROQUEMORE, Air Force Research Laboratory — High-repetition rate, ultra-high intensity lasers are coming online, opening new possibilities for statistical approaches and applications to High Energy Density Physics (HEDP) research through relativistic laser-plasma interactions (RLPI). A new experimental framework including high-repetition rate solid-density targets, high-acquisition rate detectors, data acquisition, and analysis is needed to take advantage of these new possibilities. At the Extreme Light Laboratory at AFRL, development of a liquid target system has enabled us to perform 1kHz RLPI experiments in 0.03-20 mbar background pressures and intensities up to 5 •10¹⁸ W/cm². However, RLPI studied here transpires within a moderate vacuum, which may affect the strength of the electrostatic coupling between the energetic electrons and target ions, altering expected results for both the detected electrons and accelerated ions. Both the experimental methods and measurements of the ion acceleration from sub-micron solid density targets with variable background pressures will be presented.

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