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Development Considerations for High-Repetition-Rate HEDP SCOTT FEISTER, California State University Channel Islands, PATRICK L. POOLE, Lawrence Livermore National Laboratory, PETER V. HEUER, University of California Los Angeles, KEVIN M. GEORGE, Innovative Scientific Solutions, Inc., CHRIS ORBAN, The Ohio State University, JOHN T. MORRISON, Innovative Scientific Solutions, Inc. — A new generation of high-repetition-rate lasers is being proposed and developed for use in the field of High Energy Density Physics (HEDP). While the highest-energy facilities may continue to operate at low shot-rates, higher-repetition-rate facilities with lower energies but comparable intensities can now complement them. Experiments designed to take advantage of a shot rate of >1/minute have the opportunity to expand HEDP into a computationally-intensive and rich landscape of real-time feedback and "big data" statistical analysis. However, success in this area will require more than lasers and scientific questions: high-repetition-rate operation requires a broad range of technical development and a significant shift in experimentalist thinking. We discuss experimental techniques and considerations associated with the transition from operation at several-shots-per-day towards operation at >1/minute, and we apply these to recent particle-acceleration datasets taken at high shot-rate. We focus on the digitization of HEDP particle detectors, the automation of data acquisition/analysis, and approaches to experimentation unique to high repetition-rate.

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