

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Optimization of high repetition-rate laser-driven particle and radiation sources using machine-learning techniques JON MURPHY, MILOS BURGER, YONG MA, JOHN NEES, ALEC THOMAS, KARL KRUSHELNICK, Univ of Michigan - Ann Arbor — Many applications of laser-driven particle sources benefit from operation at high repetition rate. Here, 20 milliJoule laser pulses are generated at 0.5 kilohertz repetition rate for a number of laser-plasma interaction experiments, including laser wakefield acceleration and $k\alpha$ x-ray generation. A genetic algorithm is implemented in the execution of these experiments using control of adaptive optics and a Dazzler acoustic-optic programmable dispersive filter. Utilizing the genetic algorithm in our laser-plasma interaction experiments allows for a heuristic search of optimal laser pulse parameters or target parameters for each experiment.

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Date submitted: 02 Jul 2020

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