Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Novel Accelerator Diagnostic Development for Multi-Objective Bayesian Optimization at the Argonne Wakefield Accelerator Facility JUAN PABLO GONZALEZ AGUILERA, RYAN ROUSSEL, YOUNG-KEE KIM, University of Chicago — Particle accelerators must achieve certain beam quality objectives for use in different experiments. Usually, optimizing certain beam objectives comes at the expense of others. Additionally, there are many input parameters and a limited number of measured outputs. Therefore, accelerator tuning becomes a multi-objective optimization problem with a high-dimensional decision space and a limited number of observations. Recently, multi-objective Bayesian optimization has been proposed as an efficient method to find the Pareto front for an accelerator tuning problem, and this method reduces the number of observations needed to converge. In order to experimentally test the multi-objective Bayesian optimization method, a novel accelerator diagnostic is being designed to simultaneously measure multiple beam quality metrics of an electron beam at the Argonne Wakefield Accelerator Facility. Here, we present a design consisting in a pepper-pot mask, a dipole and a scintillation screen, which allows a simultaneous measurement of the electron beam energy spread and vertical emittance.

Juan Pablo Gonzalez Aguilera
University of Chicago

Date submitted: 08 Jan 2021 Electronic form version 1.4