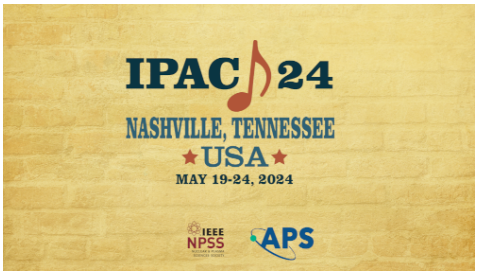

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Bayesian optimization scheme for the design of a nanofibrous high power target

Sunday, 19 May 2024 16:00 (2 hours)

High Power Targetry (HPT) R&D is critical in the context of increasing beam intensity and energy for next generation accelerators. Many target concepts and novel materials are being developed and tested for their ability to withstand extreme beam environments; the HPT R&D Group at Fermilab is developing an electrospun nanofiber material for this purpose.
The performance of these nanofiber targets is sensitive to their construction parameters, such as the packing density of the fibers. Lowering the density improves the survival of the target, but reduces the secondary particle yield. Optimizing the lifetime and production efficiency of the target poses an interesting design problem, and in this paper we study the applicability of Bayesian optimization to its solution.
We first describe our architecture for the simulation of the in-beam operations of a nanofiber target with prescribed construction parameters, which requires a heat transfer model specialized for nanofibrous media. We then explain the optimization loop setup. Thereafter, we present the optimal design parameters suggested by the algorithm, and close with discussions of limitations and future refinements.

Footnotes

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