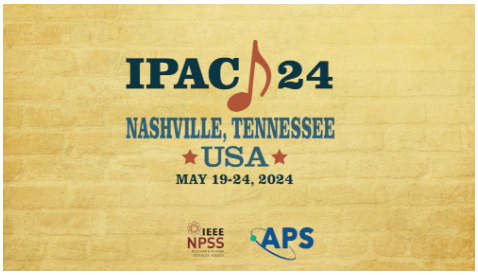

Contribution ID: **834** Contribution code: **THPG78** Type: **Poster Presentation**

AGS Booster model calibration and digital-twin development

Thursday, 23 May 2024 16:00 (2 hours)

An accurate physics simulation model is key to accelerator operation because all beam control and optimization algorithms require good understanding of the accelerator and its elements. For the AGS Booster, major discrepancy between the real physical system and online simulation model mainly comes from magnet misalignments, which also lead to beam degradation and prevent the beam from reaching the desired specifications (e.g., polarization). In this work, we propose a Bayesian optimal experimental design (BOED)-based approach for identifying the magnet misalignments using a Bmad model of the AGS Booster. This approach can find magnet control variables (i.e., currents) which are expected to lead to beam position data that most reduces uncertainty in the magnet misalignment parameters. The misalignment values can then be used to calibrate the physical model of the Booster, leading to a more accurate simulation model for future polarization optimizations, and to the development of a fully functional digital-twin.

Footnotes

Funding Agency

Work supported by Brookhaven Science Associates, LLC under Contract No. DE-SC0012704 with the U.S. Department of Energy, No. DE SC-0024287, and by NSF under Award PHY-1549132.

Paper preparation format

LaTeX

Region represented

North America

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Session Classification: Thursday Poster Session

Track Classification: MC6: Beam Instrumentation, Controls, Feedback, and Operational Aspects: MC6.T33 Online Modelling and Software Tools