THE RHIC/AGS ONLINE MODEL ENVIRONMENTS

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Abstract

An integrated online modeling environment, for use by AGS and RHIC physicists and commissioners, is being developed. This environment combines the modeling efforts of both groups in a CDEV client-server design, providing access to expected machine optics and physics parameters based on live and design machine settings. An abstracted modeling interface has been designed as a set of adaptors around core computational modeling engines (CMEs) such as MAD and Teapot++; this approach allows us to leverage existing survey, lattice, and magnet efforts, as well as incorporate new model engine developments.

To model RHIC at BNL, this implementation uses both UAL, a C++ modeling package developed at Cornell, and bl, a fast linear modeling environment previously used during the RHIC Sextant test, as core CMEs. This environment gives RHIC commissioners and their optics correction applications online access to expected RHIC optics throughout the commissioning process. A 'complete' RHIC model, with measured survey errors, and measured and statistical field errors, is available through RHIC SXF lattice files; a separate 'fast' RHIC model uses only the design lattice. Both models integrate with the RHIC ramping system and can access both design and live magnet strengths.

To model the AGS and Booster at BNL, this implementation uses a version of MAD developed at BNL that allows traditional lattice structure analysis, single pass beam line analysis, multiparticle tracking, interactive graphics, and the use of field maps. Online modeling of the AGS and Booster is a significant challenge due to their short cycle times (2.5-5 s for AGS, 5-7.5 Hz for Booster). With a requirement that the model updates within an AGS cycle or faster, the system provides full accelerator model information (as opposed to a naive application specific model) within this period using live data from all relevant accelerator devices. This version of MAD, which is a traditional monolithic application, has been ported to SGI and Sun Solaris platforms.

This talk will describe the architecture of the RHIC/AGS modeling environment, including the application interface through CDEV. I will also show recent results and modeling examples.