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Beam optics modelling for the LAMP proton storage ring upgrade using pyORBIT

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The proton storage ring (PSR) upgrade for the LANSCE Modernization Project aims to minimize the yearly maintenance outage by minimizing beam loss. Several improvements could potentially impact the beam dynamics in the PSR, including a larger coated beam pipe and new buncher, injection, and extraction systems. The larger diameter, from 4" to 6", will directly impact the beam dynamics due to an increased pole-to-pole gap height within the dipoles and quadrupoles, which would in turn increase their effective length and alter their fringe field profiles. In this work, a simulation model of the PSR ring was developed using the particle tracking code pyORBIT to study the effect of different beam pipe diameters on the beam optics. The parameters of the injected beam are derived from an existing model of the PSR injection system, and the resulting beam parameters will be used in a simulation model of the extraction system, to be presented separately at the conference. The pyORBIT results were benchmarked against beam optics simulations created using accelerator codes including MAD-X, etc. The pyORBIT simulation model of the PSR ring will be described, and the results will be presented at the conference.

Footnotes

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