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Interactions between circulating beam and the injection foil at the Proton Storage Ring of LANSCE

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At the Los Alamos Neutron Science Center (LANSCE), the injection system of the Proton Storage Ring (PSR) utilizes charge exchange via a stripping foil that converts H- into H+. While the beam losses due to partially stripped H neutrals are one of the primary focuses to reduce beam losses, the interaction between the circulating beam and the foil plays an important role as well. On average, each stored particle hits the foil ˜30 times, and the large angle scattering is the main reason for beam losses in the beam dynamics simulations. Currently, a set of bump magnets gradually move the closed orbit away from the foil during the accumulation process. In this work, we first compare different foil scattering algorithms used in our ring simulations against Monte Carlo (MC) codes. We also quantify the effects of different possible bumping schemes, the uncertainties related to injection offsets, the interaction heatmap on the foil for heat load simulations, and the effects of different injected beam.

Footnotes

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