

Abstract Submitted
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Study for Alternative Cavity wall and Inductive Insert Material

CHARLES TAYLOR, Los Alamos National Laboratory, SANDRA BIEDRON, University of New Mexico and Element Aero — The goal of this proposed work is to develop a solution to the problem of longitudinal beam instability. Beam instability has been a significant problem with storage rings' performance for many decades . The proton storage ring (PSR) at the Los Alamos Neutron Science Center (LANCE) is no exception]. To mitigate the instability, it was found that ferrite inductive inserts can be used to bunch the protons that are diverging due to the electron background. The PSR was the first to successfully use these inductive inserts to mitigate the instabilities. However, years later new machine upgrades facilitate shorter, more intense beams to meet the needs of researchers. The ferrite inserts used to reduce the transverse instabilities now induce a new longitudinal (axis of the beam trajectory) instability. A multilayer ferrite structure, Finemet, was proposed as a replacement of the PSR Toshiba ferrite inserts because of its very stable magnet flux density. Yet in Japan, J-PARC has found complications with its use. It was difficult to cool Finemet, with poor contact between the core and cooling plate causing electrical discharges around it. This study will investigate alternative magnetic materials for inductive inserts in particle beam storage rings, including the necessary engineering for maintaining the ideal temperature during operation. **LA-UR-21-20189 APPROVED FOR FOR UNLIMITED RELEASE**

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