

DESIGN AND TESTING OF THE MIT-BATES STERN-GERLACH POLARIMETER CAVITY

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Abstract

Historically, beam polarization measurement has been accomplished by scattering experiments, with the attendant complexity of target and detector installation and operation, and smallness and uncertainty of analyzing powers. The purpose of the present effort is to accomplish fast and accurate polarization measurement not as a scattering experiment, but rather as conventional beam instrumentation, with a resonant cavity pickup. This requires that the coupling of the beam magnetic moment to the pickup be enhanced to bring the signal above the noise floor, and that coupling of the beam charge to the pickup be diminished to reduce the dynamic range problem. We discuss details of cavity design that have been implemented to accomplish these ends. Presently, it is planned to install the cavity in the Bates Ring in early May of this year. Beyond polarimetry, successful polarization measurement will verify the underlying principles, and by pickup/kicker reciprocity will open the serious consideration of the possibility of polarizing the full-energy LHC proton beams in-situ.

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