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Determining the electric field in a plasma by measuring the deflection of an ion beam¹ XI CHEN, PAUL MATTHEW SCHOCH, KENNETH A. CONNOR, Rensselaer Polytechnic Institute — A design study has been completed on reconstructing the electric field in magnetically confined plasma by measuring the deflection of a non-confined heavy ion beam. The concept is to send an ion beam through a plasma device where the magnetic field \vec{B} is well known and to measure the beam position change at a detector. Either the injection angle or the energy of the ion beam can be changed to allow multiple measurements with differing amounts of plasma penetration. Calculations using a simple geometry show that the reconstruction is reasonable when the electric field \vec{E} is relatively strong (at least 1 percent of $\vec{v} \times \vec{B}$). Results of the design study are presented for both a slab and a cylindrical geometry. The electric field is reconstructed from a series of measurements using a simple layer model. This diagnostic is simple and inexpensive compared to standard electric field diagnostics such as a Heavy Ion Beam Probe. Future work will be to model an existing device such as HSX.

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