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Magnetic field inference from simulated images of a heavy ion beam in a plasma CHAO LING, KENNETH CONNOR, DIANE DEMERS, RICHARD RADKE, PAUL SCHOCH, Rensselaer Polytechnic Institute, JAY ANDERSON, University of Wisconsin at Madison — Reconstructed ion beam trajectories and subsequently inferred confining magnetic fields are computed using simulated CCD images of an ion beam in a plasma. The simulation assumes that emission from the beam is sufficiently bright to be seen with cameras using narrow band optical filters, and models the effects of 1) beam current density profile, 2) camera position, 3) finite image resolution, and 4) imaging sensor noise. The ultimate goal is to measure the magnetic structure of the Madison Symmetric Torus using the existing Heavy Ion Beam Probe. The technique recovers a 3D ion beam trajectory from a pair of perspectively projected 2D trajectory images. Uncertainty in the reconstructed 3D trajectory is illustrated based on an error propagation analysis of the 2D image pair. The trajectory of an ion with known mass and energy is used to determine the component of a magnetic field that is perpendicular to the ion trajectory. The approach presented here uses a reconstructed simulated ion trajectory in conjunction with a simple shifted-circle flux surface model to reconstruct the full magnetic field. Future work will interface this technique with the equilibrium reconstruction code MSTFit. **Work supported by US-DOE**.

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