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Characterization of CNT Plasma Using Single-Angle Imaging YOSEF KORNBLUTH, Yeshiva University, FRANCESCO VOLPE, Columbia University — Neutral plasmas were generated in the Columbia Non-neutral Torus (CNT) by means of microwave heating at 2.45 GHz. Visible images of the plasma were collected by a CCD camera and processed to remove the image of the vessel, retaining only the plasma light. The images were then analyzed by two techniques to infer the 3D profile of plasma emissivity at various wavelengths, for the sake, among others, of reconstructing the last closed flux surface and estimating the content and distribution of plasma impurities. In the first technique, we collected images of the same plasma from different angles, reorganized these images in different data arrays, which we treated as a Radon transform of the plasma. In this approach, we made no assumptions about the shape of the flux surfaces. In the second approach, the shapes were calculated beforehand by taking into account the currents in the four CNT coils, but not the plasma response, supposed negligible. By assuming that the plasma emissivity is constant along each flux surface, we infer the profile of emissivity from a single image. This can be considered a 3D generalization of the Abel inversion. We also present numerical tests of the validity of the assumption of uniform emissivity on each surface and discuss the removal of this assumption.

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