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☐ Theory     ☒ Experiment

**Soft X-Ray Imaging of the DIII-D X-point Region for Measurements of Magnetic Topology During 3-D Magnetic Perturbations,\*** E.A. Unterberg, M.W. Shafer, A. Wingen, J.H. Harris, D.L. Hillis, R. Maingi, *Oak Ridge National Laboratory*; T.E. Evans, N. Farraro, *General Atomics* - A tangential 2D soft x-ray imaging system is installed on DIII-D to directly measure the 3-D magnetic topological structure around the X-point region where there is high poloidal flux expansion. Measurements of this structure are desired to aid in the understanding of the plasma response by comparisons with model analysis during the application of resonant magnetic perturbations. The diagnostic can be tailored to measure either in the ultra-soft x-ray (USXR) or soft x-ray (SXR) spectral range with different energy filters. Data contrast is enhanced by frame-subtraction methods, spatial and temporal filtering, and impurity puffing. Data in the USXR energy band shows good agreement with vacuum modeling of the perturbed separatrix, while data in the SXR range has measured 3D magnetic structure inside the separatrix, seen for the first time. Results from 3D image inversions are shown and compared with vacuum and plasma response models.

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