

Abstract Submitted
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Extreme ultraviolet diagnostic upgrades for kink mode control on the HBT-EP tokamak¹ J.P. LEVESQUE, J.W. BROOKS, S. DESANTO, M.E. MAUEL, G.A. NAVRATIL, J.W. PAGE, Columbia University, C.J. HANSEN, University of Washington, L. DELGADO-APARICIO, PPPL — Optical diagnostics can provide non-invasive measurements of tokamak equilibria and the internal characteristics of MHD mode activity. We present research plans and ongoing progress on upgrading extreme ultraviolet (EUV) diagnostics in the HBT-EP tokamak. Four sets of 16 poloidal views will allow tomographic reconstruction of plasma emissivity and internal kink mode structure. Emission characteristics of naturally-occurring $m/n = 2/1, 3/2$, and $3/1$ tearing and kink modes will be compared with expectations from a synthetic diagnostic. Coupling between internal and external modes leading up to disruptions is studied. The internal plasma response to external magnetic perturbations is investigated, and compared with magnetic response measurements. Correlation between internal emissivity and external magnetic measurements provides a global picture of long-wavelength MHD instabilities. Measurements are input to HBT-EP's GPU-based feedback system, allowing active feedback for kink modes using only optical sensors and both magnetic and edge current actuators. A separate two-color, 16-chord tangential system will be installed next year to allow reconstruction of temperature profiles and their fluctuations versus time.

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