3-D ECE imaging on KSTAR for enhanced understanding of MHD and transport physics\(^1\) GUNSU S. YUN, WOOCHANG LEE, JAE-HYUN LEE, MINJUN CHOI, HYEON K. PARK, POSTECH, Pohang, Korea, CALVIN W. DOMIER, NEVILLE C. LUHMANN, JR., Univ. California, Davis, CA, KSTAR TEAM — The electron cyclotron emission imaging (ECE-I) system on the KSTAR, an advanced diagnostic tool for 2D visualization of MHD instabilities, has enabled the study of sawteeth \([1]\), tearing modes, and edge-localized modes (ELMs) \([2]\) in unprecedented detail with a broad spatial coverage (each of the two views \(\sim50\text{cm}\times\sim15\text{cm} \text{vertical}\times\text{radial}\)) and a fast time resolution (\(\sim1\ \mu\text{s}\)). To further advance the diagnostic capability, a second ECEI system is being installed at a location toroidally separated from the first ECEI system by \(1/16^{th}\) of the circumference. The combined ECEI systems will provide quasi-3D visualization of MHD instabilities and address many critical issues such as mode rotation (both poloidal and toroidal velocities) and toroidal nonuniformity (mode beating and localization of the fast crash) of the MHD instabilities. In addition to the MHD studies, other important diagnostic applications, such as pitch angle measurement, 3D heat transport in various time scales, and toroidal correlation of turbulent fluctuations, are envisioned.

[1] Yun et al., submitted to PRL.

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