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14.13 Fast ion D-alpha measurements using a bandpass-filtered system (f-FIDA) on EAST

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Based on the charge exchange recombination between fast ions and a neutral beam, fast ion features can be inferred from the Doppler shifted spectrum of Balmer-alpha light from energetic hydrogenic atoms[1]. With the available probe beam, the fast ion D-alpha (FIDA) diagnostic with a spectrometer system (s-FIDA) has been installed and validated on EAST [2,3,4]. In order to study the interaction between instabilities and fast-ion transport, recently we extended the FIDA measurements by using a combination of a band-pass filter and a photomultiplier tube (PMT) (f-FIDA) with up to 2MHz sampling rate. A band-pass filter selects the desired spectral band from 651nm to 654nm before detection by PMT (According to the measured s-FIDA spectrum). Preliminary data on the EAST tokamak show that the active signals have been detected from re-neutralized beam ions along the vertical and tangential viewing chords. The details will be presented in this paper to primarily address the specifications of f-FIDA hardware components and measurements. The investigation of high frequency macroscopic fluctuations measured by f-FIDA will be a further project.

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