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Kinetic equilibrium reconstruction of KSTAR plasmas including internal pitch angle profile measurement YANZHENG JIANG, Columbia Univ, STEVEN SABBAGH, YOUNGSEOK PARK, JAEHEON AHN, Columbia University, JINSEOK KO, NFRI — High fidelity kinetic equilibrium reconstructions are an essential requirement for accurate stability and disruption prediction analyses to support continuous operation of high beta KSTAR tokamak plasmas. The present work significantly expands our past magnetics-only equilibrium reconstruction capability. [1] The present kinetic equilibrium reconstructions include Thomson scattering (TS) data, charge exchange spectroscopy (CES) data, and allowance for fast particle pressure in addition to external magnetics and shaping field current data, and inclusion of vacuum vessel and passive plate currents following a "partial kinetic" approach used successfully in other devices. [2] In addition, up to 25 channels of Motional Stark Effect (MSE) data are used to constrain the local magnetic field pitch angle to produce reliable evaluation of the safety factor profile. The ramifications of the inclusion of the kinetic profiles and MSE data are examined in the context of plasma stability evaluation, and parameters and analysis used for disruption event characterization and forecasting (DECAF). [1] Y.S. Park, S.A. Sabbagh, J.W. Berkery, et al., Nucl. Fusion **51** (2011) 053001, [2] S.A. Sabbagh, A.C. Sontag, J.M . Bialek, et al., Nucl. Fusion 46 (2006) 635. *Supported by US DOE Grant DE-SC0016614.

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