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Towards Bayesian Inference of the Fast-Ion Distribution Function[1] L. STAGNER, W.W. HEIDBRINK, University of California Irvine, M. SALEWSKI, Danish Tech. U. — The fast-ion distribution function (DF) has a complicated dependence on several phase-space variables. The standard analysis procedure in energetic particle research is to compute the DF theoretically, use that DF in forward modeling to predict diagnostic signals, then compare with measured data. However, when theory and experiment disagree (for one or more diagnostics), it is unclear how to proceed. Bayesian statistics provides a framework to infer the DF, quantify errors, and reconcile discrepant diagnostic measurements. Diagnostic errors and "weight functions" that describe the phase space sensitivity of the measurements are incorporated into Bayesian likelihood probabilities, while prior probabilities enforce physical constraints. As an initial step, this poster uses Bayesian statistics to infer the DIII-D electron density profile from multiple diagnostic measurements. Likelihood functions for various fast-ion diagnostics are also described.

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