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P4.1019 Bayesian equilibrium reconstruction using JET's microwave diagnostics

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For the JET tokamak, standard equilibrium reconstructions find solutions of the Grad-Shafranov equation given diverse constraints on plasma pressure and/or magnetic field [1]. The most basic reconstruction neglects plasma pressure entirely and constraints the magnetic field via measurements of pick-up coils located around the plasma. A more advanced reconstruction exploits polarimetry and motional-stark-effect diagnostics which provide information about the magnetic field inside the plasma. These conventional approaches provide different results, estimating to some extent the systematic uncertainties of the reconstruction. An alternative approach uses Bayes' theorem to estimate the equilibrium quantities [2] by a joint posterior probability. This allows to obtain a joint solution of the Grad-Shafranov equation consistent with the underlying physics model and with uncertain data measured by magnetic and motional-stark-effect diagnostics.
The work presented infers probabilistically the axisymmetric equilibrium of an Ohmic JET plasma, relying on data measured with broadband ECE diagnostics and an extra-ordinary mode reflectometer [3]. Besides probing the plasma centrally, the data of both diagnostics constrain the local electron pressure and the magnetic field.

References
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