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Bayesian Inference of Physics Parameters in the DIII-D Charge-Exchange Recombination Spectroscopy System,*

C. Bowman, K.J. Gibson, *U. of York*; R.J. La Haye, R.J. Groebner, *GA*; N.Z. Taylor, *ORAU*; B.A. Grierson, *PPPL* – A Bayesian inference framework has been developed for the DIII-D charge-exchange recombination (CER) system, capable of computing probability distribution functions (PDFs) for desired parameters. CER is a key diagnostic system at DIII-D, measuring important physics parameters such as plasma rotation and impurity ion temperature. This work is motivated by a case in which the CER system was used to probe the plasma rotation radial profile around an m/n=2/1 tearing mode island rotating at ~1 kHz. Due to limited resolution in the tearing mode phase and short integration time, it has proven challenging to observe the structure of the rotation profile across the island. We seek to solve this problem by using the Bayesian framework to improve the estimation accuracy of the plasma rotation, helping to reveal details of how it is perturbed in the magnetic island vicinity. Examples of the PDFs obtained through the Bayesian framework will be presented, and compared with results from a conventional least-squares analysis of the CER data.

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