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8.45 Motional Stark effect imaging first results on DIII-D

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A motional Stark effect (MSE) imaging diagnostic was benchmarked against existing conventional MSE polarimeters on DIII-D and delivered new capabilities for measuring the magnetic pitch angle from 2 neutral beams and on the low field side of DIII-D. For 30 years conventional photoelastic modulator polarimeters have been used for constraining the toroidal current profile in fusion devices, however these systems require individual narrowband filters to track the Doppler shift of each channel and are therefore limited to 10s of channels. A more recently developed MSE technique utilises birefringent crystals to establish a sinusoidal spectral filter of period comparable to the pi-sigma splitting to allow imaging of the entire neutral beam emission without requiring to track the Doppler shift. While close agreement between the conventional and imaging systems is obtained for shots with toroidal magnetic field and plasma current in the normal direction, the consistency is lost for shots with either reversed field or current. An analysis of the magnetic axis position independently measured with the conventional MSE, imaging MSE, ECE and magnetics is presented to elucidate differences between the MSE measurements. *Work supported by U.S. DOE under DE-FC02-04ER54698 and DE-AC52-07NA27344

Primary author(s) : THORMAN, Alex (Australian National University)

Co-author(s) : MICHAEL, Clive (Australian National University); HOWARD, John (Australian National University); VICTOR, Brian (Lawrence Livermore National Laboratory); HOLCOMB, Chris (Lawrence Livermore National Laboratory); ALLEN, Steve (Lawrence Livermore National Laboratory)

Presenter(s) : THORMAN, Alex (Australian National University); MICHAEL, Clive (Australian National University); HOWARD, John (Australian National University); VICTOR, Brian (Lawrence Livermore National Laboratory); HOLCOMB, Chris (Lawrence Livermore National Laboratory); ALLEN, Steve (Lawrence Livermore National Laboratory)

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