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Quantitative estimation of the beam fast ion effects on MSE measurement in Alcator C-Mod[1] JINSEOK KO, MIT Plasma Science and Fusion Center, STEVE SCOTT, Princeton Plasma Physics Laboratory, HOWARD YUH, Nova Photonics, Inc. — The MSE diagnostic in Alcator C-Mod observes anomalous behavior during beam-into-gas calibrations and discrepancies between measured pitch angles versus pitch angles calculated by EFIT. We conjecture that these phenomena are caused by beam neutrals that ionize following collisions with the torus gas or plasma and then re-charge exchange at a random gyro-angle. Motional Stark emission from such 'secondary' beam neutrals will have a Doppler shift and a polarization direction that differs from that emitted by primary beam neutrals. This effect is particularly large in Alcator C-Mod because the diagnostic beam injects perpendicularly and thus the residence time of the beam ions in the MSE field of view is limited only by the grad-B drift. We present calculations of this effect on the MSE spectrum and polarization angle and evaluate the consequences of rotating the beam several degrees in the toroidal direction.

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