

## Development and installation of a scintillator based detector for fast-ion losses in the MAST-U tokamak

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A scintillator-based detector for fast-ion losses due to MHD instabilities and externally-applied 3D fields has been developed and installed in the MAST-U tokamak [1]. The detector has a pitch-angle resolution of 2-3° and sufficient energy resolution to separate all three NBI injection energy components. The detector head is mounted on a rotatory drive to change the aperture orientation on a shot-to-shot basis, adapting the detector velocity-space coverage to the equilibrium  $q_{95}$ , an especially important feature for a spherical tokamak. A synthetic diagnostic that includes detector head geometry, scintillator efficiency and optical transmission has been constructed. Full orbit simulations have been carried out using the ASCOT [2] and LOCUST [3] codes to estimate the predicted signals in MHD quiescent plasmas heated by on- and off-axis NBI and with and without externally applied 3D fields. The impact that externally applied 3D fields with different toroidal and poloidal spectra have on the NBI distribution has been estimated and will be discussed in the presentation.

[1] J.F. Rivero-Rodriguez et al, 22nd Topical Conference on High Temperature Plasma Diagnostic (accepted).

[2] E. Hirvijoki et al, *Comput. Phys. Commun.* **185** (2014), 1310-1321.

[3] R. Akers *et al.*, 39th EPS Conference & Int. Congress on Plasma Physics, P5.088 (2012)

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