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Analysis of filament statistics in fast camera data on MAST[1]
TOM FARLEY, University of Liverpool, FULVIO MILITELLO, NICK WALKDEN, JAMES HARRISON, SCOTT SILBURN, Culham Centre for Fusion Energy, JAMES BRADLEY, University of Liverpool — Coherent filamentary structures have been shown to play a dominant role in turbulent cross-field particle transport [D'Ippolito 2011]. An improved understanding of filaments is vital in order to control scrape off layer (SOL) density profiles and thus control first wall erosion, impurity flushing and coupling of radio frequency heating in future devices. The Elzar code [T. Farley, 2017 in prep.] is applied to MAST data. The code uses information about the magnetic equilibrium to calculate the intensity of light emission along field lines as seen in the camera images, as a function of the field lines' radial and toroidal locations at the mid-plane. In this way a 'pseudo-inversion' of the intensity profiles in the camera images is achieved from which filaments can be identified and measured. In this work, a statistical analysis of the intensity fluctuations along field lines in the camera field of view is performed using techniques similar to those typically applied in standard Langmuir probe analyses. These filament statistics are interpreted in terms of the theoretical ergodic framework presented by F. Militello & J.T. Omotani, 2016, in order to better understand how time averaged filament dynamics produce the more familiar SOL density profiles.

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William Morris
Culham Centre for Fusion Energy

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