Velocity-space tomography using prior information at MAST - DTU Orbit (08/08/2019)

Velocity-space tomography provides a way of diagnosing fast ions in a fusion plasma by combining measurements from multiple instruments. We use a toroidally viewing and a vertically viewing fast-ion D-alpha diagnostic installed on the mega-amp spherical tokamak (before the upgrade) to perform velocity-space tomography of the fast-ion distribution function. To make up for the scarce amount of data, prior information is included in the inversions. We impose a non-negativity constraint, suppress the distribution in the velocity-space region associated with null-measurements, and encode the belief that the distribution function does not extend to energies significantly higher than those expected neoclassically. This allows us to study the fast-ion velocity distributions and the derived fast-ion densities before and after a sawtooth crash.

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