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Non-diffusive suprathermal ion transport associated with blobs in TORPEX plasmas[1] ALEXANDRE BOVET, École Polytechnique Fédérale de Lausanne, Centre de Recherches en Physique des Plasmas, Lausanne, Switzerland, FABIO AVINO, AMBROGIO FASOLI, IVO FURNO, EPFL-CRPP, KYLE GUSTAFSON, EPFL-SV, PAOLO RICCI, EPFL-CRPP — We present unprecedented space and time-resolved measurements of the transport of a suprathermal ion beam injected in the toroidal device TORPEX. Experiments are performed in turbulence dominated by an ideal-interchange mode using a Li6+ ion source and a set of energy analyzers. Depending on the suprathermal ion energy, the transport exhibits subdiffusive or superdiffusive behaviors. The fast ion current fluctuations are quasi-Gaussian in the former regime and strongly intermittent in the latter. In the superdiffusive case, using conditional sampling, we show that the transport is associated with intermittent field-aligned blobs. In the subdiffusive case, supra-thermal ions average the turbulent structures during their gyro-motion and their vertical drift. These results complement our investigations of the supra-thermal ion transport using 3D time-averaged measurements, which are in agreement with numerical simulations. Numerical modeling is performed by computing the trajectories of tracers in a turbulent electrostatic field generated by a 2D global fluid model. Gyro- and drift-averaging reduce the transport. The evolution of the radial distribution of fast ions can be modeled by a fractional diffusion equation describing fractional Lévy motion.

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