The transport of (low-Z) impurities in fusion plasmas is dominated by turbulence effects, especially near and beyond half-radius. While the gyro-kinetic approach is the usual choice for the characterization of impurity transport, in this talk we tackle the problem using a statistical method based on test-particle trajectories in stochastic fields. The technical features of the method are discussed in detail.
In this framework, we show how anomalous diffusion and inward or outward radial pinches emerge due to the interplay between ITG and TEM turbulence via the interaction between ExB, polarization drifts, and parallel acceleration.
The dependencies between transport coefficients and plasma parameters are obtained from extended numerical simulations. The theoretical framework is validated on experimental results obtained recently at ASDEX Upgrade for the transport of Boron impurities.