Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Level crossings and excess times of intermittent fluctuations in scrape-off layer plasmas[1] AUDUN THEODORSEN, ODD ERIK GARCIA, UiT - The Arctic University of Norway — Transient transport events associated with the radial motion of filamentary structures in the scrape-off layer (SOL) may cause significant heat load on the plasma facing components. It is therefore of interest to describe the statistical properties of intermittent plasma fluctuations in the SOL. Investigations of SOL plasmas in the Alcator C-Mod and TCV tokamaks show that the plasma fluctuations are well described by a stochastic model consisting of uncorrelated pulses arriving according to a Poisson process. The pulse have a fixed, exponential shape and exponentially distributed amplitudes. Here, we extend the stochastic model by deriving the joint probability density function of the signal and its time derivative. This result is used to find the rate of positive level crossings over and the mean time above a prescribed signal threshold. Previously, discrepancies between predictions of excess time statistics based on the assumption of normally distributed signals and measurement data have been interpreted as a sign of intermittency. The model presented here quantifies the level of intermittency and only requires parameters obtained from the lowest moments and the correlation function of the signal itself.

[1]Supported by the Research Council of Norway under grant 240510/F20.

Audun Theodorsen
UiT - The Arctic University of Norway

Date submitted: 12 Jul 2016 Electronic form version 1.4