

# **Analysis of extreme events propagation on biased plasma in Texas Helimak**

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This work presents the propagation analysis of the extreme events observed in the Texas Helimak plasma in positive biased discharges [1]. Texas Helimak is a basic plasma toroidal device located at the University of Texas at Austin. In this machine, the combination between the toroidal and the small vertical fields create helical magnetic field lines with curvature and shear. As the plasma in helimaks is colder and less dense when compared with tokamaks, it is possible to use a large set of diagnostic probes. In Texas Helimak the radial electric field can be perturbed by imposing an external voltage bias. The perturbed turbulence characteristics depend on the applied external bias [2]. Overall, for positive biasing, turbulence shows a non Gaussian PDF with extreme events. To investigate the propagation characteristic of extreme events in Texas Helimak, time histograms are constructed and a Gaussian distribution is associated with the time difference between extreme events observed in two neighborhood probes. The propagation of the events is associated with the mean delay between these time distributions in a direction with at least three probes. We observe that the external positive bias modifies the measured delay at the vertical direction up to a saturation value. On the other hand, at the radial direction, the observed delay does not change much with the bias value.

[1] K. W. Gentle and H. He, Plasma Sci. Technol.10, 284 (2008).

[2] D. L. Toufen, et al, Phys. Plasmas 20, 022310 (2013).