

Singularity Spectra and Generalized Extreme Value Distributions of Decimetric Radio Bursts Associated with Flares

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The search for turbulent-like patterns and extreme dynamics from time series of solar radio bursts has recently advanced due to high-resolution and high-sensitivity observations. Such solar radio emissions in the decimetric frequency range (above 1 GHz) are very rich in temporal and spectral fine structures due to nonlinear processes occurring in the magnetic structures on the corresponding active regions. In this paper we analyze the decimetric fine structures of 8 X-Class Flares events observed from Brazilian Solar Spectroscope (1-2.5 GHz) and Ondrejov radiospectrograph (3 GHz). The Singularity Spectra [1] and Generalized Extreme Value (GEV) distribution [2] are obtained and we interpret our findings as evidence of inhomogeneous lagrangian-like MHD turbulence driving the underlying non-gaussian plasma emission process. Once GEV statistical behavior was found for 75% of the events, the flare occurrence is discussed into the context of solar extreme events. [1] Bolzan et al., Ann. Geophys., 27, 569-576, 2009. [2] S. Coles, An Introduction to Statistical Modeling of Extreme Values, Springer Series in Statistics, (2001) 228 pp., Springer-Verlag, Berlin, Germany.

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