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Log-normal Intermittency in Alfvenic Turbulence VLADIMIR ZHDANKIN, JILA, University of Colorado at Boulder, STANISLAV BOLDYREV, University of Wisconsin-Madison, CHRISTOPHER CHEN, Imperial College London — Random cascade models provide an attractive phenomenological framework for describing intermittency in turbulence. These models generally predict the distribution of local coarse-grained energy dissipation rates, from which the scaling of structure function exponents is inferred after assuming the refined similarity hypothesis. However, it remains unclear to what extent random cascade models can be applied to describe intermittency in large-scale turbulent plasmas. To address this, we investigate the statistics of the coarse-grained energy dissipation rate in numerical simulations of magnetohydrodynamic turbulence and in measurements of the solar wind, using magnetic field gradients as a surrogate variable in the latter case. We present evidence that the resulting distributions and their moments are described remarkably well as a log-normal random cascade. We find that the intermittency parameter matches in the two systems when a weak guide field is used for the simulations, while a strong guide field makes the dynamics more intermittent. We discuss possible implications for other measured quantities in the solar wind, including the statistics of magnetic discontinuities.

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