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MHD Turbulence and Particles

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MHD Turbulence is a strongly nonlinear dynamics of conductive fluids, e.g. plasma. Recent progress in theory regarding almost all basic regimes of this dynamics – from how the magnetic field is generated (dynamo problem), to how turbulence is decaying, to what are the asymptotic scaling laws, allowed us to proceed with more observationally motivated questions. One of them is why almost all strongly magnetized environments are indeed observable, e.g. why such environments are infused with high-energy particles, their distributions stretching to energies orders of magnitude higher than thermal. Another basic question is why plasma distribution function at low energies is also non-thermal. I will offer a couple of generic mechanisms derived based on the ideas we developed in turbulence, which may explain some of these basic facts.

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