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**Magnetic self-organization in driven MHD turbulence**[1] STANISLAV BOLDYREV, JEAN CARLOS PEREZ, U. Wisconsin-Madison — Magnetohydrodynamic turbulence is a starting point for modeling large-scale plasma motions in a variety of systems ranging from astrophysical objects to laboratory experiments. Ideal MHD system has three conserved quantities: energy, magnetic helicity and cross-helicity. In decaying turbulence, energy decays faster than the other two invariants, leading to creation of structures due to the process of self-organization. Magnetic self-organization is much less understood in driven MHD turbulence. In particular, the cross-helicity, an ideal invariant cascading toward small scales in a turbulent state, has only recently become an object of systematic study as it became clear that it plays a fundamental role in driven MHD turbulence. We will demonstrate that driven MHD turbulence spontaneously creates domains of positive and negative cross helicity, which possess a hierarchical structure: inside small domains there exist smaller and stronger polarized domains and so on. This leads to spontaneous alignment of magnetic and velocity fluctuations and progressive reduction of nonlinear interaction at small scales, and it significantly affects the spectrum and structure of turbulent MHD systems.

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