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Hosking integral and its implications for constraining primordial magnetic fields

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An approximate conserved quantity in magneto-hydrodynamics, the so-called Hosking integral, was discovered recently. It quantifies statistical fluctuations of magnetic helicity, analogously to the conserved quantities in pure hydrodynamics, which quantifies statistical fluctuations of velocity or angular momentum of the fluid motion. The conservation of the Hosking integral is supported by follow-up studies and resolves a well-known inconsistency between numerical and analytic results. We apply the conservation of the Hosking integral to describing the evolution of primordial magnetic fields and, based on that, revisit constraints on them. In particular, we will highlight how important to understand the evolution of primordial magnetic fields, by revisiting constraints from CMB spectral distortions.

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