

## Generation of cosmological magnetic fields from primordial density perturbations

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The presence of substantial magnetic fields in galaxies and even on larger scales such as in clusters of galaxies is observationally indicated. The origin of such magnetic fields with large coherence length, however, is still one of the biggest mysteries in cosmology.

We find that cosmological density fluctuations, which explain the large scale structure of the universe and cosmic microwave background temperature anisotropies, can also produce sufficient amount of magnetic fields on the cosmological scales at the epoch of recombination if we take the second order couplings into account. These magnetic fields should inevitably exist since we do not introduce any arbitrary assumptions.