

# Resurrecting Gravitational Vector Modes and their Magnetogenesis

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The detection of primordial tensor modes, i.e. gravitational waves, through primordial CMB B-modes is considered the smoking gun signal for inflation. However, in order to solidify this conclusion, we need to insure that other primordial mechanisms do not produce the same signal. To that end, primordial gravitational vector modes (V-modes) and their sourcing of primordial magnetic fields (PMF), i.e. magnetogenesis, is revisited in this talk. As the adiabatic V-mode generically decays with expansion, we consider three exotic initial conditions, involving both the neutrino and dark sectors, which circumvent this issue and lead to observational imprints. The best fitting parameters in these three cases to CMB and BAO data are found, and their resulting B-mode spectra are compared to data from BICEP/Keck and SPTpol. The outcome is that none of the proposed initial conditions can produce large enough PMFs to seed every type of magnetic fields observed. However, the resultant V-modes are still consistent with the data and ought to be constrained for a better understanding of the primordial Universe before its hot big-bang phase.

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