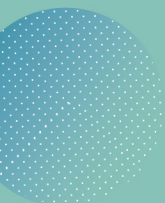




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TDiff invariant gauge fields in cosmology

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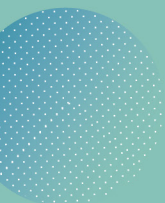
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Abstract

We study the dynamics of Abelian gauge fields invariant under transverse diffeomorphisms (TDiff) in cosmological contexts. We show that in the geometric optics approximation, very much as for Diff invariant theories, the corresponding massless gauge bosons propagate along null geodesics and particle number is conserved. In addition, the polarization vectors are orthogonal to the propagation direction and the physical (transverse projection) polarization is parallel transported along the geodesics. We also consider TDiff invariant Dirac spinors, study the coupling to the gauge fields and analyze the conditions in order to avoid violations of Local Position Invariance. The contributions to the energy-momentum tensor of the gauge field are also analyzed. We find that, in general, the breaking of Diff invariance makes the electric and magnetic parts of the vector field to gravitate in a different way. In the sub-Hubble regime we recover the standard radiation-like behaviour of the energy density, however in the super-Hubble regime the behaviour is totally different to the Diff case, thus opening up a wide range of possibilities for cosmological model building. In particular, possible effects on the evolution of large-scale primordial magnetic fields are discussed.

