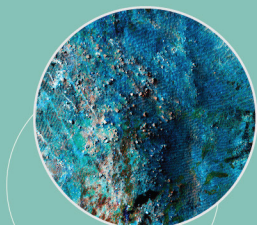




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# Multi-field TDiff theories for cosmology

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## Abstract

We consider theories which break the invariance under diffeomorphisms (Diff) down to transverse diffeomorphisms (TDiff) in the matter sector, consisting of multiple scalar fields. In particular, we regard shift-symmetric models with two free TDiff scalar fields in a flat Robertson-Walker spacetime and use the perfect fluid approach to study their dynamics. As a consequence of breaking the Diff symmetry, an effective interaction between the fields is induced from the conservation of the total energy-momentum tensor (EMT), which yields geometrical constraints different to those in single-field models, all of this without the necessity to introduce any interacting term by hand. We study the several single-field domination regimes and analyze the energy exchange. Thereupon, we introduce an application of these models concerning an interacting dark sector, and compare the theoretical predictions of our model to observational data from Type Ia supernovae and  $\Lambda$ CDM.

