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Hidden cosmological dynamics in teleparallel gravity

The cosmology of modified teleparallel gravity theories, such as $f(T)$ or scalar-torsion gravity, is a widely studied field. Most often one considers flat ($k = 0$) cosmology, while the non-flat case ($k = \pm 1$) is less well studied. While in the former it is easy to find a combination of tetrad and spin connection that solves the antisymmetric part of the field equations, thus leaving only the Friedmann equations, this task is less obvious in the non-flat case. In a recent work we have shown how to find such tetrads and spin connections and that they are not unique.

In my talk I will briefly show how it is possible to solve the antisymmetric part of **any** generic teleparallel gravity theory by solving a few simple equations and show their non-unique solutions. I will then use these different solutions and show how they lead to different Friedmann equations in $f(T)$ and scalar-torsion cosmology, and thus different cosmological dynamics. The remarkable fact about these solutions is that on some initial Cauchy hypersurface they have the same metric, and differ only in their tetrad / spin connection, so that they cannot be distinguished initially by observations. However, due to the different Friedmann equations, the metrics will evolve differently, and so the observable dynamics depends on these "hidden" dynamical variables.

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