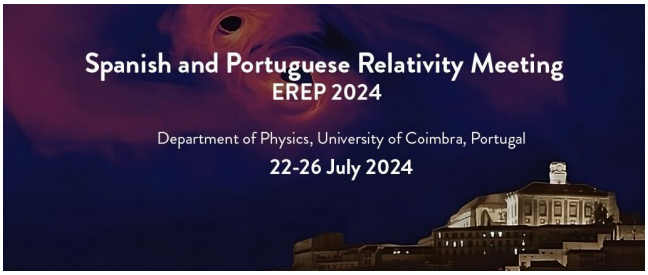

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Recent Results in Conformal Killing Gravity

Wednesday 24 July 2024 14:30 (15 minutes)

Recently Harada proposed a new gravitational theory which is third order in the derivatives of the metric tensor. This has attracted some attention particularly as it predicts a late-time transition from cosmological deceleration to accelerated expansion without assuming the presence of dark-energy or a non-zero cosmological constant. This theory has become known as conformal Killing gravity (CKG).
In this talk the most general exact solutions of the CKG field equations are discussed for a number of important physical situations: homogeneous and isotropic cosmological (FRWL) models, static spherically symmetric vacuum and electrovac spacetimes, and plane and *pp*-waves.
For any metric in conformal Killing gravity it is shown that more than one matter source can generate a particular solution. For example, the addition of an arbitrary "dark-energy"source with energy-momentum tensor $T_{ab} = \lambda g_{ab}$ has no effect on the metric. In CKG one can say "dark energy does not gravitate". If the metric admits one or more Killing vectors or tensors, the ambiguity in the possible matter sources increases considerably.
Another novel feature of the theory is that there are source-less cosmological solutions. The simplest example is the static Einstein Universe which satisfies the vacuum field equations of CKG. There are also vacuum time-dependent FRWL solutions of the theory; thus providing counter-examples to a possible Birkhoff theorem in CKG.

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