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Bumblebee fluctuations in curved spacetimes

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The bumblebee field is a self-interacting vector field whose vacuum expectation value (vev) defines a privileged direction in spacetime. This spontaneous breaking of the Lorentz symmetry has been extensively studied in flat spacetimes, wherein the bumblebee fluctuations give rise to two Nambu-Goldstone transverse mode and one longitudinal massive mode. In flat spacetimes, the NG transverse mode behaves like a gauge vector field. In this talk, we discuss the features of the bumblebee fluctuations in curved spacetimes. By assuming a AdS_5 five dimensional spacetime and a cosmological Friedmann-Robertson-Walker (FRW) 3-brane embedded, we found a exponentially suppressed
self-interacting constant with respect to the extra dimension. For a spacelike vev along the extra dimension, we employed a Kaluza-Klein (KK) dimensional reduction for both models. The transverse mode diverges along the extra dimension and then, an extended bumblebee-dilaton theory is required to trap the massless KK mode on the brane in the noncompact extra dimension model. The conservation of the bumblebee current prevents the longitudinal mode to acquire a KK mass. Along the brane, the massless KK transverse mode behaves like a Maxwell field whereas the longitudinal mode is suppressed by the cosmological expansion.

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