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**Particle Cosmology  
after Planck**

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## Torsion in extra dimensions and one-loop observables

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We study gravity with torsion in extra dimensions and derive an effective four-dimensional theory containing four-fermion contact operators at the fundamental scale of quantum gravity in the TeV range. These operators may have an impact on the low-energy observables and can manifest themselves or can be constrained in precision measurements. We calculate possible contributions of these operators to some observables at the one-loop level. We show that the existing precision data on the lepton decay mode of Z boson set limits on the fundamental scale of the gravity and compactification radius, which are more stringent than the limits previously derived in the literature.

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