On torsion, gravity and the spectral action principle

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ABSTRACT

In this talk I will consider closed Riemannian manifolds equipped with orthogonal connections (with torsion). I will review Einstein-Cartan-Hilbert theory, a generalisation of the classical Einstein-Hilbert theory of gravity to connections with torsion. Next, I will consider Dirac operators which are induced by orthogonal connections. Connes' spectral action principle states that all physically relevant actions should be deducible from the spectrum of a suitable Dirac operator. Building on this principle, Chamseddine and Connes constructed a spectral action which is motivated by eigenvalue counting and which predicts the Lagrangian of the Standard Model. I will present a formula for the Chamseddine-Connes action in the presence of torsion, discuss its critical points and describe a possible connection to Loop Quantum Gravity. If time permits I will comment on Spectral Triples constructed from Dirac operators with torsion. This project is joint work with Frank Pfaeffle.