Beyond General Relativity, Beyond Cosmological Standard Model

Contribution ID: 2

Type: contributed talk

## Perturbatively renormalizable quantum gravity

Monday 1 July 2019 15:30 (20 minutes)

The Wilsonian renormalization group (RG) requires Euclidean signature. The conformal factor of the metric then has a wrong-sign kinetic term, which has a profound effect on its RG properties. In particular around the Gaussian fixed point, it supports a Hilbert space of renormalizable interactions involving arbitrarily high powers of the gravitational fluctuations. These interactions are characterised by being exponentially suppressed for large field amplitude, perturbative in Newton's constant but non-perturbative in Planck's constant. By taking a limit to the boundary of the Hilbert space, diffeomorphism invariance is recovered in the continuum quantum field theory. Thus the so-called conformal factor instability is the key that allows the construction of a genuine continuum limit for quantum gravity.

Tim R. Morris. Renormalization group properties in the conformal sector: towards perturbatively renormalizable quantum gravity. JHEP, 08:024, 2018, 1802.04281.
Matthew P. Kellett and Tim P. Morris. Renormalization group properties of the conformal

[2] Matthew P. Kellett and Tim R. Morris. Renormalization group properties of the conformal

mode of a torus. Class. Quant. Grav., 35(17):175002, 2018, 1803.00859.

[3] Tim R. Morris. Perturbatively renormalizable quantum gravity. Int. J. Mod. Phys.,

D27(14):1847003, 2018, 1804.03834.

[4] Tim R. Morris. Quantum gravity, renormalizability and dieomorphism invariance. SciPost Phys., 5:040, 2018, 1806.02206.

[5] Tim R. Morris. to appear.

Author: MORRIS, Tim (Southampton University)

Presenter: MORRIS, Tim (Southampton University)

Session Classification: Beyond I