Approximate Killing symmetries in non-perturbative quantum gravity

An open question in quantum gravity is if and how small scale quantum fluctuations and inhomogeneities behave in such a way that at some larger scale they can be well approximated by a classical geometry with some number of exact symmetries. Causal Dynamical Triangulation (CDT) is a non-perturbative approach to quantum gravity, based on a lattice regularisation of space-time, in which these kind of questions possibly can be addressed. After a short introduction of the framework, I will present a specific notion of approximate Killing vectors that can be generalised to simplicial manifolds using the framework of discrete exterior calculus. These discrete approximate Killing vectors show promise as an observable to study effective symmetries in quantum gravity. As a proof of concept, I will present a comparison between quantum ensembles of three different two-dimensional models, CDT, Dynamical Triangulations and small perturbations around flat space.

Author: Mr REITZ, Marcus (Radboud University, IMAPP)

Co-authors: LOLL, Renate (Radboud University, IMAPP); BRUNEKREEF, Joren (Radboud University, IMAPP)

Presenter: Mr REITZ, Marcus (Radboud University, IMAPP)