

## MP 10: Noncommutative Geometry

Zeit: Donnerstag 8:30–9:20

Raum: JUR H

MP 10.1 Do 8:30 JUR H

**Spectral Triples of Holonomy Loops** — ●JESPER GRIMSTRUP — Niels Bohr Institute, Copenhagen, Denmark

In my talk I will review the construction of a spectral triple over a configuration space of connections. The spectral triple construction is related to quantum gravity since the interaction of the algebra with the Dirac type operator reproduces the structure of the Poisson bracket of General Relativity when formulated in terms of Ashtekar variables. I will show how the Dirac Hamiltonian in 3+1 dimensions emerge naturally from the construction in a semi-classical approximation. This indicates that the framework includes canonical matter degrees of freedom. Also, I will show how an operator is constructed which in the semi-classical limit gives the constraints of canonical gravity.

MP 10.2 Do 8:55 JUR H

**Model Building in Noncommutative Geometry** — ●CHRISTOPH STEPHAN — Institut für Mathematik, Universität Potsdam

Noncommutative geometry (NCG) based on spectral triples allows to unify classical Yang-Mills-Higgs (YMH) theories and General Relativity in a single geometrical framework. The relevant spectral triples contain a finite part which encodes the particle content of the YMH models and is subject to strong geometrical restrictions. These restrictions permit a classification of certain (irreducible) spectral triples and lead to a prominent position of the Standard Model (SM) as a "minimal" finite spectral triple.

I will give a short introduction to the basic ideas of NCG and present a "bottom-up" approach to model building in the framework of NCG. This noncommutative model building kit has led to phenomenologically interesting models beyond the SM. These models extend the fermionic and the gauge sector of the SM as well as the scalar sector.