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**MP 5: Hauptvorträge Mittwochmorgen**

Zeit: Mittwoch 8:30–10:00

Raum: KIP Gr. HS

**Hauptvortrag** MP 5.1 Mi 8:30 KIP Gr. HS  
**Lorentzian Non-Commutative Geometry and Covariant Quantum Field Theory** — ●RAINER VERCH — Institut für Theoretische Physik, Universität Leipzig, Vor dem Hospitaltore 1, D-04103 Leipzig

We report on joint work in progress with M. Paschke and A. Rennie on an approach towards Lorentzian non-commutative geometry, generalizing the Riemannian non-commutative spectral geometry framework of A. Connes. One of the main motivations is to extend the concept of general covariant quantum field theories to the situation where the spacetime geometries need not be "classical" (i.e. "commutative") which, in turn, draws its motivation from trying to develop a theory which incorporates quantum effects and gravity at all scales. We will give some (still tentative) ideas about general covariant quantum field theory on non-commutative spacetime geometries. In a more specialized setting of Moyal-deformed Minkowski-spacetime, we study the model of the linear Dirac field as a concrete example. In particular, we consider the scattering of the Dirac field by non-commutative

potentials in this framework, and present a joint result with M. Borris showing that the scattering transformation is unitarily implementable in the natural vacuum representation. We will also discuss the extent to which this may give hints towards an operational interpretation of non-commutative spacetime structure, and the relation to other approaches.

**Hauptvortrag** MP 5.2 Mi 9:15 KIP Gr. HS  
**The Energy of Heavy Atoms: Relativistic Effects** — ●HEINZ SIEDENTOP — Mathematisches Institut, Ludwig-Maximilians-Universität München, Theresienstraße 39, D-80333 München, Germany

We will discuss to which extent the energy of heavy atoms can be described by nonrelativistic quantum mechanics and when relativistic effects become important. The presentation will be based in joint work with R. Frank, KTH, and S. Warzel, Princeton University, and previous work with R. Cassanas.