MP 5: Quantum Field Theory I

Zeit: Mittwoch 11:00–12:05 Raum: Z6 - SR 1.012

Hauptvortrag MP 5.1 Mi 11:00 Z6 - SR 1.012

The Quantum sine-Gordon model in pAQFT — •Dorothea Bahns — Mathematisches Institut, Georg August Universität Göttingen, Germany

The sine-Gordon model in the ultraviolet finite regime is quantized in the framework of perturbative Algebraic Quantum Field Theory. It is shown that the resulting S-matrix, at first given as a formal power series, converges. The Haag-Kastler net of local von Neumann algebras is constructed, and its equivalence with the massive Thirring model is proved. In contrast to other authors, we do not add an auxiliary mass term, and we work completely in Lorentzian signature.

This is joint work with Klaus Fredenhagen (Hamburg) und Kasia Rejzner (York).

MP 5.2 Mi 11:45 Z6 - SR 1.012

Closing cumulant hierarchies: Quantal methods for classical dynamics — •Cora Uhlemann — DAMTP, University of Cambridge

Nonlinear problems in manifold areas of physics (such as cosmology, plasma physics and hydrodynamics including turbulence) are described by an infinite hierarchy of coupled differential equations for cumulants. Typically, truncations are based on fluid-like approximations that cannot capture the phenomenology of the system featuring multiple streams. I suggest to take a closer look at closure schemes that rely on the correspondence principle connecting quantal and classical dynamics. I will illustrate this idea for the gravitational clustering of dark matter, described by a phase-space distribution solving the Vlasov-Poisson equation. I will show that an approximate phase-space distribution can be constructed from a wave function solving the Schrödinger-Poisson equation. Hence, 6-dimensional phase-space information can be encoded in two functions on 3-dimensional position space that consistently generate cumulants at all orders. This provides a starting point for constructing approximate closure schemes that are consistent with the nonlinear dynamics.