

MP 8: HV Hock: QFT in Noncommutative Space

Time: Wednesday 10:30–11:10

Location: H-HS VII

Invited Talk

MP 8.1 Wed 10:30 H-HS VII

Exact solution of the noncommutative ϕ_1^4 QFT model
— •ALEXANDER HOCK¹, RAIMAR WULKENHAAR¹, and HARALD GROSSE² — ¹WWU Münster, Germany — ²University of Vienna, Austria

A noncommutative quantum field theory is a QFT where the underlying space is equipped with an additional algebraic structure. The scalar ϕ^4 model which is also known as Grosse-Wulkenhaar model will be presented in 4 dimensions, which has the same degrees of divergence as the ordinary ϕ^4 model.

The set of infinitely many Ward-Takahashi identities leads to closed integral equations for the correlation functions. These equations can be solved with techniques of algebraic geometry and complex analysis. The exact solution of the 2-point function will be shown which consists of hypergeometric functions. The perturbative expansion coincides with the Feynman graph computations by using Zimmermann's forest formula.

The remarkable property is that the theory is resumable even though the renormal problem appears and the number of Feynman graphs grows with $\mathcal{O}(n!)$.