# MP 9: Quantum Field Theory

Time: Wednesday 11:15–11:55 Location: H-HS VII

MP 9.1 Wed 11:15 H-HS VII

**Absence of chiral symmetry breaking in Thirring models in 1+2 dimensions** — •Julian Lenz, Björn Wellegehausen, and Andreas Wipf — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany

The Thirring model is an interacting fermion theory with current-current interaction. The model in 1+2 dimensions has applications in condensed-matter physics to describe the electronic excitations of Dirac materials. Earlier investigations suggest that a critical number of (reducible) flavors $N_c$ exists, below which chiral symmetry can be broken spontaneously. While values for $N_c$ found in the literature vary broadly, recent lattice studies with chiral fermions have indicated that chiral symmetry is unbroken for all integer flavor numbers. To find an accurate value $N_c$ we study the Thirring model for analytically continued $N$ between 0.5 and 1.1. We see no chiral symmetry breaking in all Thirring models with 1 or more flavors of (4-component) fermions. Besides the transition to the unphysical lattice artifact phase we find strong evidence for a hitherto unknown phase transition that exists for $N > N_c$ and should answer the question of where to construct a continuum limit.

MP 9.2 Wed 11:35 H-HS VII

**Operator-algebraic renormalization and wavelet theory** — •Alexander Stottmeister — Mathematisches Institut, Westfälische Wilhelms-Universität Münster, 48149 Münster

I will discuss on-going work on an operator-algebraic approach to the Wilson-Kadanoff renormalization group. I will present a simple argument that ensures the existence of scaling limits in this approach, thus, indicating the naturalness of the approach. As a test case, I will explain how the theory of wavelets can be utilized to implement this approach in terms of generalized block-spin transformations in the setting of scalar field theories. Locality of the resulting scaling limit can be shown by rigorous implementation of a recent proposal of T. Osborne using Lieb-Robinson bounds.

The project is a joint work with V. Morinelli, G. Morsella and Y. Tanimoto.