MP 12: Quantenmechanik II

Time: Wednesday 16:50–17:30 Location: HFT-FT 101

MP 12.1 Wed 16:50 HFT-FT 101

Lieb-Robinson bounds and Haag-Ruelle scattering theory for gapped quantum spin systems — Sven Bachmann[1], Wojciech Dybalski[2], and •Pieter Naaijkens[3] — [1]Mathematisches Institut der Universität München, Deutschland — [2]Zentrum Mathematik, Technische Universität München, Garching, Deutschland — [3]Institut für Theoretische Physik, Leibniz Universität Hannover, Deutschland

We consider translation invariant gapped quantum spin systems satisfying the Lieb-Robinson bound and containing single particle states in a ground state representation. Following the Haag-Ruelle approach from relativistic quantum field theory, we construct states describing collisions of several particles and the corresponding S-matrix. We discuss the main technical difficulties in translating results from relativistic QFT to lattice systems, and dicusss how Lieb-Robinson bounds can be used to solve these problems.

MP 12.2 Wed 17:10 HFT-FT 101

On uncertainty relations for angular momentum — Lars Dammeier, •René Schwonnek, Kais Abdelkhalek, and Reinhard F. Werner — Institut für Theoretische Physik, Leibniz Universität Hannover

We report on quantifying uncertainty for operators satisfying the angular momentum algebra. This is a natural example of how the concept of uncertainty can be generalised to the case of more than two non-commuting observables.

We present our results for the case of preparation uncertainty. Using variances as a figure of merit, the concept of uncertainty can be captured by characterising the set of all tuples of variances which can be attained by a quantum state in a measurement of angular momentum components. Uncertainty relations then correspond to lower bounds on this set.

The shape of this set strongly depends on the total spin of system. For spin 1/2 and 1 we provide an exact characterisation of these sets. Additionally, we investigate the behavior for very large spin.