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Derivation of the time-dependent Hartree equations for strongly interacting dense Fermionic systems

Thursday, November 6, 2025 4:20 PM (45 minutes)

The time-dependent Hartree and Hartree-Fock equations provide effective mean-field descriptions for the dynamics of large Fermionic systems and play a fundamental role in many areas of physics. In the talk I will present a rigorous derivation of the time-dependent Hartree equations as the large-N limit of the microscopic Schrödinger dynamics of N Fermions confined to a volume of order one and interacting via strong pair potentials. A central step in our analysis is the implementation of time-dependent gauge transformations, which eliminate the dominant contribution from the interaction potential in both the Schrödinger and Hartree evolutions. In contrast to other results we will not have to assume semiclassicality of the gas.

Presenter: PICKL, Peter (Université de Tübingen)