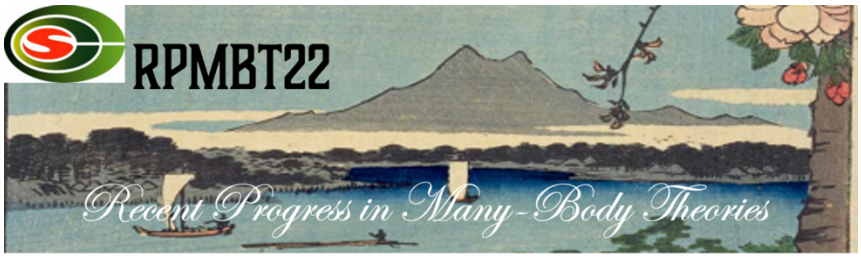

Contribution ID : 39 Type : Oral

The two body density matrix of a Tomonaga Luttinger liquid

Friday, 27 September 2024 09:55 (25)

The n-body reduced density matrix (n-RDM) characterizes higher order correlations in an interacting many-body system. This quantity can be used to compute any n-body observable without direct access to the full wavefunction, and is experimentally measurable. The problem of computing higher order density matrices becomes increasingly challenging as the number of local operators grows. However, within the Tomonaga Luttinger liquid regime, bosonization provides access to correlation functions by representing them as exponentials of bosonic field operators that are analytically tractable, even in finite size systems. In this talk we present a detailed analysis of the 2-RDM for an interacting one dimensional fermionic system including both diagonal matrix elements (corresponding to density-density correlations) as well as off-diagonal components which demonstrate how coherences are affected by the interplay of interactions and indistinguishability. As an application we analyze density matrix renormalization group results for the J-V model of interacting, spinless fermions in one dimension in the low-energy sector and use our 2-RDM to compute two-body observables.

Primary author(s) : Prof. DEL MAESTRO, Adrian (University of Tennessee, Knoxville)

Co-author(s) : Ms RADHAKRISHNAN, Harini (University of Tennessee, Knoxville); Dr BARGHATHI, Hatem (University of Tennessee, Knoxville); Dr THAMM, Matthias (University of Leipzig)

Presenter(s) : Prof. DEL MAESTRO, Adrian (University of Tennessee, Knoxville)

Session Classification : Session