ENTANGLEMENT AS A CORRELATION MEASURE IN FEW-BODY STATES

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Recent advances in ultracold gases experiments have offered the opportunity to study systems of a few trapped atoms with specifically tailored interactions in strongly-correlated regime. Within such experimental environments, the direct measurements of correlation characteristics have become feasible, which provided new impetus for theoretical studies of entanglement spectra, i.e. the eigenvalues of the reduced density matrix of systems partitioned into two subsystems.

I will study the entanglement spectra of systems effectively described by few-body Schrödinger equation with interactions depending on various powers of the distance between the constituents. The linear entropy and von Neumann entropy will be discussed in dependence on the interaction type and strength, especially in the neighborhood of critical points. In particular, the dimensional crossover from two to one dimensions will be explored, by observing how confining a transverse spatial dimension influences entanglement. The relationship of entanglement and quantum chemical correlation measures will be shown for two-electron He-like ions. Also, the stability properties of systems trapped in open potentials will be studied by examining the behavior of entanglement entropies on the border between the regimes of bound and resonant states.