On the mean-field approximation of a Quantum system

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ABSTRACT:

The purpose of this joint work (in collaboration with S. Graffi and A. Martinez) is to characterize the behavior of a Quantum system in the mean field approximation, when N, the number of particles, diverges simulteneosly with the inverse Planck constant h. It is proven that, under suitable assumptions on the two-body potential, the Wigner transform of the system factorizes in the limit and that each factor satisfies the classical Vlasov equation (associated to the same potential). The proof is based on a non-conventional decomposition of the WKB method and on some hydrodynamical estimates.