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Rate of Convergence towards Hartree Dynamics with Singular Interaction Potential

We consider a system of N -Bosons with a two-body interaction potential $V \in L^2(\mathbb{R}^3) + L^\infty(\mathbb{R}^3)$, possibly more singular than the Coulomb interaction. We show that, with $H^1(\mathbb{R}^3)$ initial data, the difference between the many-body Schrödinger evolution in the mean-field regime and the corresponding Hartree dynamics is of order $1/N$, for any fixed time. The N -dependence of the bound is optimal.