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Xuwen Chen and **Justin Holmer*** (holmer@math.brown.edu), Brown University, Box 1917,
151 Thayer St, Providence, RI 02912. *Derivation of the 1D focusing nonlinear Schrödinger
equation from quantum many-body dynamics.*

We consider the dynamics of N bosons in one dimension. We assume that the pair interaction is attractive and given by $N^{\beta-1}V(N^\beta \cdot)$ where $\int V \leq 0$. We develop new techniques in treating the N -body Hamiltonian so that we overcome the difficulties generated by the attractive interaction and establish new energy estimates. We also prove the optimal 1D collapsing estimate which reduces the regularity requirement in the uniqueness argument by half a derivative. We derive rigorously the one dimensional focusing cubic NLS with a quadratic trap as the $N \rightarrow \infty$ limit of the N -body dynamic and hence justify the mean-field limit and prove the propagation of chaos for the focusing quantum many-body system. (Received September 16, 2013)