Towards qualitative theory of large quantum coherent structures

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Design, characterization and optimization of large artificial quantum structures (e.g., practically useful quantum computers) is hindered by the fact that their efficient simulation by classical means is fundamentally impossible. On the other hand, important information about such systems can be obtained from a qualitative analysis of their "general case" behaviour. In particular, finding the universal dimensionless combinations of their parameters (figures-of-merit), which control transitions between qualitatively different regimes of operation, will help establish the desired parameters of the system with the use of scaled experiments and model calculations.