Tuning the quantum critical crossover in quantum dots[1] GANPATHY MURTHY, University of Kentucky — Quantum dots with large Thouless number g embody a regime where both disorder and interactions can be treated nonperturbatively using large-N techniques (with N=g) and quantum phase transitions can be studied. Here we focus on dots where the noninteracting Hamiltonian is drawn from a crossover ensemble between two symmetry classes, where the crossover parameter introduces a new, tunable energy scale independent of and much smaller than the Thouless energy. We show that the quantum critical regime, dominated by collective critical fluctuations, can be accessed at the new energy scale. The nonperturbative physics of this regime can only be described by the large-N approach, as we illustrate with two experimentally relevant examples. G. Murthy, PRB 70, 153304 (2004). G. Murthy, R. Shankar, D. Herman, and H. Mathur, PRB 69, 075321 (2004)

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