Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Quantum phase transition of the sub-Ohmic rotor model MANAL AL-ALI, THOMAS VOJTA, Missouri University of Science and Technology — We investigate the behavior of an N-component quantum rotor coupled to a bosonic dissipative bath having a sub-Ohmic spectral density $J(\omega) \propto \omega^s$ with $s < 1$. With increasing dissipation strength, this system undergoes a quantum phase transition from a delocalized phase to a localized phase. We determine the exact critical behavior of this transition in the large-N limit. For $1 > s > 1/2$, we find nontrivial critical behavior corresponding to an interacting renormalization group fixed point while we find mean-field behavior for $s < 1/2$. The results agree with those of the corresponding long-range interacting classical model. The quantum-to-classical mapping is therefore valid for the sub-Ohmic rotor model.

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Date submitted: 11 Nov 2011 Electronic form version 1.4