QUANTUM STOCHASTIC SYNCHRONIZATION

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We study within the spin-boson dynamics the synchronization of quantum tunneling with an external periodic driving signal. As a main result we find that at a sufficiently large system-bath coupling strength (Kondo parameter $\alpha > 1$) the thermal noise plays a constructive role in yielding both a frequency and a phase synchronization in a symmetric two-level system. Such riveting synchronization occurs when the driving frequency supersedes the zero temperature tunneling rate. As an application evidencing the effect, we consider a charge transfer dynamics in molecular complexes.

[1] I. Goychuk, J. Casado-Pascual, M. Morillo, J. Lehmann, and P. Hänggi, submitted to Phys. Rev. Lett. (2006).

[2] J. Casado-Pascual, J. Gómez-Ordóñez, M. Morillo, J. Lehmann, I. Goychuk, and P. Hänggi, Phys. Rev. E **71**, 011101 (2005).