

Talk-8

Dynamic Control of quantum bits to maintain coherence

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Abstract

Decoherence is simultaneously a deep conceptual issue and an annoying obstacle to the realization of quantum information devices. In this talk it is reviewed how dynamic decoupling protects a qubit from decoherence. The deleterious coupling to the environment is averaged out by tuned switching of the qubit by pulse sequences. We show how tailored pulse sequences can be optimized in a way independent from the unknown coupling to a bath causing dephasing [1]. The main result is by now rigorously proved for general dephasing [2]. The influence of the essential noise at high-energies is illustrated both theoretically and experimentally [3,4]. Routes to suppress general decoherence are also pointed out [5].

[1] Uhrig, Phys Rev Lett 98, 100504 (2007)

[2] Yiang/Liu, Phys Rev Lett 101, 180403 (2008)

[3] Uhrig, New J Phys 10, 083024 (2008)

[4] Biercuk et al., arXiv:0812.5095

[5] Uhrig, arXiv:0810.5616