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Analytically solvable pulses for spin qubit rotations

SOPHIA ECONOMOU, Naval Research Lab — The hyperbolic secant pulse is a well known pulse shape for which the time dependent Schrodinger equation of a two-level system is analytically solvable. It has in the past been proposed [1] for optical spin rotations in quantum dots, and used experimentally to that end [2]. In this talk, a family of pulses will be introduced which can be viewed as the generalization of the sech pulse. These pulses may have skewed temporal profiles and frequency modulation (“chirping”). I will present results for the fidelity of spin rotations using some of these pulses and show that in the case of “Raman-type” control, where an auxiliary excited state is used, it can be advantageous to replace the usual 2π sech pulse.

[1] Economou et al., Phys. Rev. B **74**, 205415 (2006), Economou and Reinecke, Phys. Rev. Lett. **99**, 217401 (2007)

[2] Greilich et al., Nature Physics **5**, 262 (2009)

Prefer Oral Session
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