A nugget from FOCUS:

**Coherent optical control of spin coherence**

Duncan Steel

Coherent control of quantum systems has importance to a number of fundamental and practical objectives including quantum computing. Indeed, sequential qubit operations for quantum computation are a direct manifestation of coherent control. Furthermore, a demonstration of coherent control of optically induced coherence serves to prove that the measurement of the quantum decoherence time is real and that the observed decay is of quantum coherence.

In this slide, we show a demonstration of coherent optical control of single electron spin coherence in quantum dots. The measurement utilizes two pump pulses that are carefully phase locked with respect to each other. Depending on the phase of the two pulses which are separated in time, the quantum coherences induced by each pulse are either in phase or out of phase with each other, resulting in constructive (upper dashed line) or destructive (lower dashed line) interference. In the case of the lower dashed line, the probe pulse shows the oscillations are completely suppressed, demonstrating complete destructive interference. The x-axis shows the time evolution of quantum phase of the total Raman coherence as function of the probe delay. The y-axis represents the phase difference between the two pump pulses (measured in psec). The strength of the signal is represented by the color.
Coherent Optical Control of Spin Coherence

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Constructive interference of $E_P$ and $E_Y$ increases the Raman coherence

Destructive interference of $E_P$ and $E_Y$ destroys the Raman coherence

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