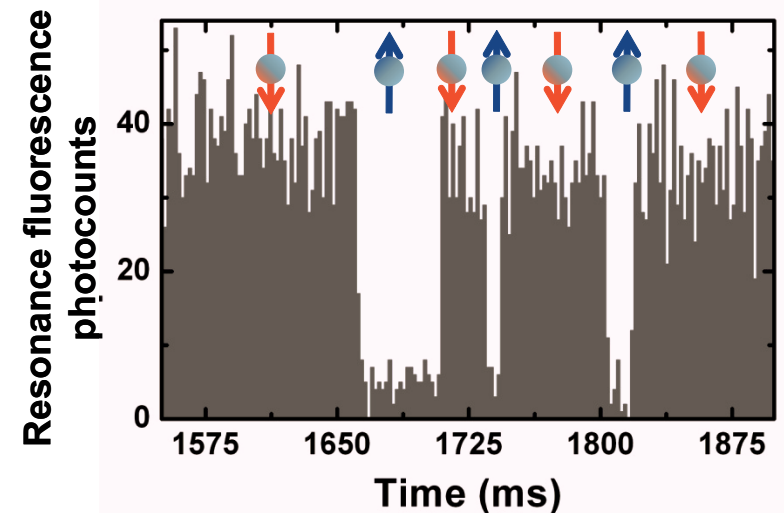
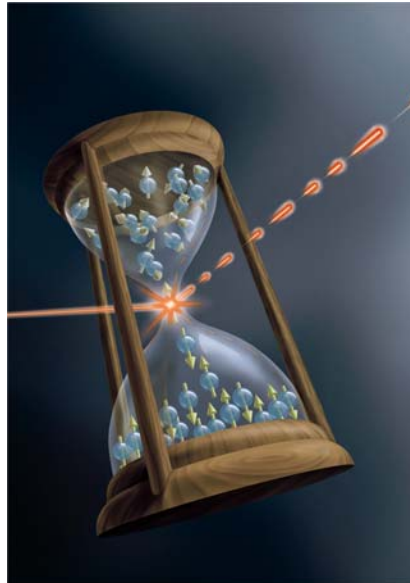


# Optical control of quantum dot spins: From qubits to sensors



**Dr. Nick Vamivakas**  
**Cavendish Laboratory**  
**University of Cambridge**

PhD Boston U. 2007

In this talk I will discuss high-fidelity spin-state preparation and ultrafast coherent spin manipulation utilizing a quantum dot molecule. We leverage laser spectroscopy to operate the quantum dot as a sensitive probe of its environment.

**Special day and time**  
**3:30 pm, Friday, Oct 29, 2010**  
Sloan Auditorium, Goergen 101  
Refreshments provided.

# Optical control of quantum dot spins: From qubits to sensors

Dr. Nick Vamivakas  
Atomic, Mesoscopic and Optical Physics Group  
Cavendish Laboratory  
University of Cambridge

## Abstract

Spins in optically active quantum dots offer one potential quantum bit realization and recent demonstrations have shown high-fidelity spin-state preparation and ultrafast coherent spin manipulation. The final challenge, i.e. optical single-shot measurement of the electron spin, has proven to be difficult in single quantum dots since the same laser that probes the spin state also flips the spin being measured. In this talk I will discuss our remedy to this problem which is to decouple the spin preparation and measurement transitions by utilizing a quantum dot molecule. We operate our device in a regime such that monitoring the intermittent resonance fluorescence from an excitonic transition in one quantum dot reveals the spin orientation of an electron in the second quantum dot. Finally, I will discuss how we leverage laser spectroscopy to operate the quantum dot as a sensitive probe of its environment.

## Biography

I received my PhD from the OCN Laboratory at Boston University in 2007 under the supervision of Profs. Swan, Unlu and Goldberg. My current research efforts in University of Cambridge include optical control of quantum-dot spins and nanoplasmonics.