

Measuring in the dark - classical and quantum results

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The use of destructive interference for measuring classical and quantum systems has a long and interesting history. I will present both microwave and optical experiments where we observe deep sub-wavelength spatial resolutions (with the necessary SNR trade-offs). Specifically, the focusing of Fisher information at the destructive interference nodes will be presented and via a steep phase gradient this leads to the observed resolution. These ideas will then be extended to work on Two-Mode-Squeezed-Vacuum sensing (joint work with the Gefen group). I will then show how we apply interference for spectroscopy of superconducting qubits via tailored adiabatic echo pulses. Finally I will briefly (time permitting) show a spin locking of a superconducting qubit for robust coherence protection against structured noise baths (joint work with the Retzker group).

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