COLLOQUIUM

# Quantum Sensors for Fundamental and Information Science :

## *What has it got to do with Fermilab?*

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'Quantum sensors' fundamentally exploit the 'entanglement' of wave functions in quantum systems and can potentially reach far higher sensitivities and resolutions than devices operating on purely classical principles. A class of such quantum sensors (e.g. superconducting circuits embedded in superconducting microwave cavities, atomic beam interferometers, etc.) have the revolutionary potential of offering us the capability of laboratory based exploration, detection and measurement of phenomena that manifest in very "weak processes" in nature (e.g. the "dark" sector of the universe or gravitational wave background from very early universe) and of superior 'computing', for the benefit of both fundamental and information science. Advanced superconducting accelerator and detector technologies at Fermilab combined with 'Qubit' and atomic beam techniques being developed at collaborating institutions position Fermilab uniquely for non-accelerator-based laboratory-scale scientific experiments on campus for fundamental science and for developing a prototype 'quantum computer' test-bed. I will outline recent exciting initiatives and developments at the Fermilab, DOE and elsewhere in this area.