



Condensed Matter Seminar

Prof. Herbert Fotso

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“Taming the Solid State Environment: Spin Qubits and Quantum Optics”

Monday, April 1, 2019

4:00pm – 5:00pm

304 Robeson Hall

A variety of solid state systems are promising candidates for implementation of quantum bits (qubit) in quantum information processing (QIP). These include the Nitrogen-Vacancy centers and other color centers as well as quantum dots. For such systems, stationary-to-flying qubit conversions are of central importance. Furthermore, the ability to generate distributed entanglement across distant quantum nodes is essential for the construction of scalable quantum networks and for many fundamental QIP operations (quantum teleportation, Bell inequality tests...). Solid state quantum emitters are subject to fluctuations of different types in the surrounding bath (charge, spin, strain) and these fluctuations can in turn modify their optical properties and adversely affect QIP operations. For instance, entangling two qubits can be achieved through photon interference on a beam splitter. However, this process will see its efficiency drastically diminished by fluctuations in the uncorrelated environments of the respective qubits. We will show that appropriate control protocols can be employed to mitigate the effects of the environment on quantum emitters and enhance the efficiency of fundamental quantum information processing operations.

