

**QUANTUM INFORMATION PROCESSING WITH QUANTUM DOTS IN
PHOTONIC CRYSTALS**

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In this talk, I will review our recent progress on implementing quantum information processing with semiconductor quantum dots in photonic crystals. I will start by describing our recently developed technique for selective, reversible tuning of quantum dots on chip by up to 1.8nm, which overcomes the problem of large quantum dot inhomogeneous broadening - usually considered the main obstacle in employing such platform in practical quantum information processing systems. I will then present our experimental results on cavity QED with single quantum dots in photonic crystals, both in the strong and weak coupling regimes, which is critical for construction of such systems. In particular, I will show how our local quantum dot tuning technique can be employed to selectively tune quantum dots on chip into strong coupling regime with cavities. Finally, I will present our preliminary experimental work on building quantum information processing circuits on chip, and discuss prospects for implementation of a quantum repeater based on the described platform.