



Joint Quantum Sciences Seminar

Wednesday, September 21, 4:00 pm

Jefferson 250

Prof. Jelena Vuckovic

Stanford University

"Quantum nanophotonics"

Nanophotonic structures that localize photons in sub-wavelength volumes are possible today thanks to modern nanofabrication and optical design techniques. Such structures enable studies of new regimes of light-matter interaction, quantum and nonlinear optics, and new applications in computing, communications, and sensing. I will review our recent work on the traditional quantum nanophotonics platform based on InAs quantum dots inside GaAs photonic crystal cavities [1-3], as well as our progress on alternative material systems diamond and silicon carbide [4], which could potentially bring the described experiments to room temperature and facilitate scaling to large networks of resonators and emitters. Finally, the use of inverse design nanophotonic methods [5], that can efficiently perform physics-guided search through the full parameter space, leads optical devices with properties superior to state of the art, including smaller footprints, better field localization, and novel functionalities.

- [1] *Optica*, vol. 3, 931-936 (2016)
- [2] *Nature Photonics*, vol. 10, pp. 163-166 (2016)
- [3] *Physical Review Letters*, vol. 114, 233601 (2015)
- [4] *Nano Letters*, vol. 16 (1), pp. 212-217 (2016)
- [5] *Nature Photonics* 9, 374-377 (2015)

Student Presentation by Srujan Meesala will begin at 4:00 PM

Guest Presentation will begin at 4:30 PM

Refreshments will be provided