

## Quantum Noise in Photonic Logic: from Free Carriers to Ising Machines

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**9:30 am - 10:15 am**

**Room: Lecture Hall, Würzburger Straße 46**

**Abstract:** As nanophotonics and materials research drive optical logic to the low-power, few-photon limit, quantum properties of light start to matter. Even if we aren't building a quantum computer, these quantum effects can play a key role limiting the performance of existing devices, or enabling entirely new dynamics. I present quantum simulations of devices based on semiconductor (free-carrier) optical nonlinearities and propose an optical annealing machine based on this effect. In addition, I apply these methods to study synchronously-pumped optical parametric oscillator (OPO) networks, which have recently been proposed and demonstrated, and are a promising alternative to digital computers for Ising optimization problems.

**Bio:** Ryan Hamerly graduated from Caltech in 2010, and is pursuing his PhD in Applied Physics with the Mabuchi group at Stanford. Although his undergraduate research with Prof. Yanbei Chen focused on black hole event horizon geometry, he now studies quantum optics, with a focus in control theory, semiclassical models, nonlinear optics, and next-generation computing.

