

# Department of Physics and Astronomy

## General Colloquium

Thursday, September 6<sup>th</sup>, 2018  
PHYS 203 at 3:30 pm

*(Refreshments served at 3:00 pm in PHYS 242)*

**Professor Paul Kwiat**

University of Illinois at Urbana Champaign



### **Advanced Quantum Communication**

It is now well understood that quantum mechanics can enable otherwise impossible feats in the processing and communicating of information. For example, quantum cryptography enables provably secure encryption, even as the looming reality of quantum computers threatens our existing methods of encryption. To help bridge the gap to an eventual global multi-node quantum network, we are pursuing airborne and satellite-based free-space quantum communication. Free-space platforms may be easily moved/reoriented to target new nodes, and an agile, reconfigurable system -- we are implementing a multi-copter drone-based system -- could enable quantum cryptography in applications prohibited by current approaches, such as temporary networks in seaborne, urban, or even battlefield situations. At longer scale, we are pursuing a quantum link from the International Space Station to earth, which will use hyperentanglement to enable several advanced quantum communication protocols, including multi-bit-per-photon key distribution and "superdense" teleportation.