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## Quantum Entanglement for Fun and Profit 101 Uses for Schroedinger's Cat

Department of Physics Colloquium

**N**early 80 years after Schroedinger described entanglement as the quintessential nonclassical phenomenon, and 50 years after Bell showed the inconsistency of quantum correlations with local realism, the quantum information revolution seeks to use its almost magical properties to enable new feats in information processing. As we shall see, entanglement can now be produced at high rates with exquisite precision, enabling unprecedented tests of nonlocality and such feats as quantum cryptography and teleportation. I will describe some of these miracles, and our investigations into how the usual benefits can be further extended, by using more complex quantum states (e.g., hyper-entanglement). Time and appetites permitting, I may give a brief lesson in quantum cooking.

Paul G. Kwiat is the Bardeen Chair in Physics, at the University of Illinois, in Urbana-Champaign. A Fellow of the American Physical Society and the Optical Society of America, he has given invited talks at numerous national and international conferences, and has authored over 135 articles on various topics in quantum optics and quantum information, including several review articles. His research includes the phenomena of quantum interrogation, quantum erasure, and optical implementations of quantum information protocols, particularly using entangled—and hyperentangled—photons from parametric down-conversion.