



**Birck Nanotechnology Center/Purdue Quantum Science and Engineering Institute (PQSEI)**



Franco Wong received the B.S. in Mechanical Engineering and B.A. in Physics from the University of Rochester in 1977, and his M.S. and Ph.D. in Applied Physics from Stanford University in 1979 and 1983, respectively. From 1984 to 1986, he did his postdoctoral research with Dr. John L. Hall at JILA on precision measurement techniques. He joined MIT in 1986 as a Research Scientist at the Research Laboratory of Electronics and was promoted to Senior Research Scientist in 2003. His research interests center on quantum and nonlinear optics, currently focusing on the generation and application of entangled light for quantum communication and quantum information processing. Dr. Wong holds several U.S. patents in areas of nonlinear optical devices. Dr. Wong is a Fellow of the Optical Society of America.

## **Quantum-enabled sensing and secure communications**

**Franco Wong**  
Senior Research Scientist, MIT

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Quantum physics has the potential to significantly outperform classical techniques in areas such as computing, sensing, and communications. Loss and noise in practical situations are major impediments to implementations of quantum protocols. Here we show a quantum sensing technique called quantum illumination that can perform better than the best classical method in detecting the presence of a faint target embedded in a lossy, noisy environment. The same technique can be applied to quantum-secured communication or key distribution. In floodlight quantum key distribution protocol, Gbps secret key rates have been achieved in a 10-dB lossy transmission channel, showing 3 orders of magnitude improvement over other quantum protocols. I will discuss future applications of these quantum sensing and communication techniques.