# The 100-Year Future for Optics

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The most interesting part of a 100-year future is the last three-quarters of it, following the arrival of the predictable stuff. Even obvious insights can quickly look silly—think of the confident predictions of personal airplanes for commuting to work made in the 1930s and 1940s, while we've managed only bigger highways and longer-lasting traffic jams since then. Meanwhile, entire generations of music playing systems arrived unpredicted, became universally adopted, and are already forgotten. How many futurists imagined xerography, or personal computers, or intelligent telephones that are also cameras and computers, to say nothing of the FANG team—Facebook, Amazon, Netflix, and Google?

What we need is an unconstrained view of the future of optics, and Quantum Optics is nearly ideal for this because we think we know what it is, but it's still far from fully explored. The meaning of quantum mechanics itself is steadily debated while more and more optical processes are being given quantum properties. On the near horizon, and easy to connect to current research themes, one expects to see and possibly benefit from optical control of cars and roadways, photon counting without photon annihilation, wide uses for optical entanglement both quantum and classical, quantum optical networks for secure identity hacking, the development of powerful sources of squeezed light, 4-photon down-conversion crystals and quantum-communicating telescope arrays, in addition to inexpensive consumer items such as invisibility cloaks that will fit in ladies' purses.

Farther out, but inevitable, will be lethal hand-held optical weapons and wide-area satellite monitoring of their use. Entirely speculative, but more fascinating, will be fundamental discoveries employing quantum optical sensitivity, including: (i) experimental proof that a connection between quantum mechanics and gravity cannot exist, (ii) detection of coherent quantum opto-galactic signals pervading space, (iii) discovery of the origin of quantum randomness, (iv) prediction of the longest possible electromagnetic wavelength and its detection, (v) real-time optics for in-vivo whole-body DNA correction, (vi) verification of the macroscopic limit to quantum superposition, and (vii) reliable quantum-optical disassembly and recovery of bio-systems, allowing practical teleportation. In the end, all of these projections will turn out to be too conventional. To reorient a remark attributed to Steve Jobs, and thinking of Marie Curie, the optical scientist doesn't know what she'll be most thrilled to find until she finds it.