Mathematical Challenges of Quantum Radar

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One of the major scientific thrusts from recent years has been to try to harness quantum phenomena to dramatically increase the performance of a wide variety of classical information processing devices. These advances in quantum information science have had a considerable impact on the development of standoff sensors such as quantum radar. In this talk we will briefly describe recent theoretical research that suggests that by harnessing quantum phenomena we can improve standoff electromagnetic sensing using quantum radar. Indeed, quantum radar appears to be possible because of recent promising theoretical and experimental results regarding manipulation, entanglement, propagation, detection, and interferometry of quantum states. At the same time, many theoretical and experimental questions remain open (e.g., fast and efficient entanglement generation, single photon detectors, quantum signal processing, and quantum memories). In this talk I will briefly discuss the mathematical challenges involved in quantum radar theory. In particular, I will talk about the need to develop novel data fusion algorithms to tackle the possibility of large networks of quantum sensors.