

# Introduction to Quantum Optical Sensing: From Fundamentals to Applications

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Today, we discuss the general framework developed for quantum optical sensing in recent years, covering the basic theory behind the advancements made, and describe the important works that made these advancements. A few paradigmatic examples of classical optical sensors and corresponding quantum sensors are compared in parallel, upon parameter estimation theory that is widely used for determining fundamental bounds on how well parameters can be estimated in both the classical and quantum regime. Lastly, a particular quantum optical sensing application called quantum plasmonic sensing is discussed through several key works, which enable us to understand how the sensing performance of classical plasmonic sensors can be improved beyond the classical limit with the potential of the use in chemical and biological sensing.