

## **Quantum Optics and Radiative Transport**

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The quantum theory of light-matter interactions is primarily concerned with systems consisting of a small number of atoms. We will begin with a gentle introduction to the basic principles of quantum optics. We will then discuss recent work on quantum optics in random media and show that in this setting, there is a close relation between the theory of spontaneous emission and kinetic equations for PDEs with random coefficients. The talk will focus on quantum analogs of radiative transport theory, the classical version of which has widely applied to the study of light propagation in complex media. Applications to inverse problems and imaging will be briefly discussed.