

Field fluctuations and photon statistics in nonlinear radiation-matter interactions

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Half a century ago, it was shown that “incoherent” light is more efficient than “coherent” light in inducing a non-linear process; which at that time seemed counterintuitive. A limited number of experimental results have been in general agreement with that prediction. Yet, to this day, that statement is greeted with disbelief and not only by students. The story and content of the talk revolves around the quantum stochastic properties of radiation, as reflected in its correlation functions. Correlation functions are important tools in many quantum systems, as they provide information well beyond average (expectation) values of dynamical variables. As such they serve as probes of quantum systems. In the case of radiation, however, they turn out to also be tools for inducing counterintuitive effects in radiation-matter interactions. Some of these effects are discussed in the context of recent developments.

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