

Sources of nonclassical light

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Abstract

In this lecture I will introduce the definition of nonclassical light and consider various sufficient conditions for nonclassicality: anti-bunching, quadrature and twin-beam squeezing, Wigner function negativity, and conditions based on higher-order correlation functions. I will also mention the Klyshko-Lee measure of nonclassicality. Further, I will give an overview of the types of nonclassical light that can be obtained in experiment. These include, in particular, single photons emitted by atoms or their solid-state counterparts and pairs of entangled photons obtained through spontaneous parametric down-conversion and spontaneous four-wave mixing. In this connection, I will discuss different types of entanglement. Finally, I will show how the last two processes, when strongly pumped, generate squeezed vacuum. I will also consider squeezed coherent light and bright twin beams. In contrast to squeezed vacuum and squeezed light, whose Wigner function is Gaussian, I will mention some types of non-Gaussian states of light.