

Measurement techniques in quantum optics

Author

MARIA CHEKHOVA - Max-Planck Institute for the Science of Light

Abstract

This lecture will describe measurements performed on nonclassical light, both faint (single photons and photon pairs) and bright (squeezed vacuum and displaced squeezed states). For faint light, these measurements include photon counting and Hanbury Brown – Twiss-type experiments, aimed at finding normally ordered correlation functions, especially the second-order one. The relation between the second-order normalized correlation function and the Fano factor will be discussed. I will also consider the Hong-Ou-Mandel experiment and its polarization version. For pairs of polarized photons, polarization tomography will be described. I will further introduce the method of homodyne detection and briefly describe the Wigner function tomography. Next, I will pass to the case of bright nonclassical light, in particular squeezed light, for which the homodyne detection is the main instrument of characterization. Finally, I will discuss the problem of detecting bright non-Gaussian states of light and mention a way to make this measurement loss-tolerant.