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Introduction to generation, manipulation and characterization of optical quantum states.
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Summary: In this brief tutorial we provide the theoretical tools needed to describe the generation, manipulation and characterization of optical quantum states and of the main passive (beam splitters) and active (squeezers) devices involved in experiments, such as the Hong-Ou-Mandel interferometer and the continuous-variable quantum teleportation. We also introduce the concept of operator ordering and the description of a system by means of the p-ordered characteristic functions. Then we focus on the quasi-probability distributions and, in particular, on the relation between the marginals of the Wigner function and the outcomes of the quadrature operator measurement. Finally, we introduce the balanced homodyne detection to measure the quadrature operator and the homodyne tomography as a tool for characterizing quantum optical states also in the presence of non-unit quantum efficiency.

MSC:
81-XX Quantum theory
82-XX Statistical mechanics, structure of matter

Keywords:
quantum optics; quantum states; Wigner function; homodyne detection; homodyne tomography

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