Annotation to the final qualifying work

"CHARACTERIZATION OF LOW-PHOTON LIGHT SOURCES

BY PHOTOCOUNT STATISTICS»

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The graduation thesis is focused on the important part of quantum optics, namely pulsed low-photon light sources. Pulsed low-photon light sources are sources of light with medium amount of photons contained in every pulse being about several units. Methods of measuring energetic characteristics of light of pulsed low-photon quasi-coherent light sources are developed in the thesis.

A technique is described for recovering photon statistics from statistics of photocounts which are produced in a photon number detector by the light of a pulsed low-photon quasi-coherent source. In contrast to the correlation measurements of the single number g2 (0), which is primarily suitable for assessing coherence, this technique is able to obtain complete statistics of light, which in turn can be used to characterize the source in more detail: not only the fact of deviation from the ideal coherent state, but also the nature and causes of such a deviation. To extract this information about the source from photon statistics in the same chapter, a method for extracting the incoherent component was proposed and described.

An experimental implementation of collecting photocount statistics using a multi-pixel photon detector is described. For experimental data, photon statistics was recovered in source pulses, then an incoherent contribution was extracted from this statistics. All results were obtained for two measurements that were carried out under different conditions: measurements of a laser source in the dark and measurements of a laser source in which additive noise was simulated by illuminating the experimental setup with incoherent light. In the second case, the extracted noncoherent contribution had large values.