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AG Theoretical Quantum Optics

Characterizing quantum light from incomplete measurements

The detection and characterization of quantum light is essential for the development of quantum technologies. However, a full quantum state reconstruction is in many cases not possible because of experimental limitations of the detection scheme. A particular example of such information-incomplete detection schemes are click-counting detectors, which discriminate between clicks rather than photocounts.

We present methods for the verification of quantum features of light based on the click statistics recorded with such detectors. First, we certify quantum correlations between two modes of an experimentally generated state. Second, we directly sample phase-space distributions from unbalanced homodyne measurements with click-counting detectors and verify the nonclassical character of the quantum state by their negativities. Finally, we present a method for the simulation of atmospheric loss in laboratory experiments with click-counting detectors.

References:

- J. Sperling, et al., Phys. Rev. Lett. 115, 023601 (2015).
- M. Bohmann et al., arXiv:1711.10962 [quant-ph].
- M. Bohmann, et al., Phys. Rev. A 95, 063801 (2017)

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Slides: English

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