

Stochastic Optical Quantum Circuit Simulator: model, design and implementation

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SOQCS is a Python and C++ library of modular design [1] aimed at the simulation of optical circuits where photonic states are modeled as Fock wavepackets. The objectives of the library are to provide a design tool for photonic circuits and to allow for calculations of different imperfections in the circuit operation. These include, for example, effects associated with unbalanced beamsplitters or partial distinguishability of photons [2] among others.

Arbitrary optical circuits are defined in the code by means of listing their non-ideal basic components and their interconnections. The operation of these circuits can be simulated using different numerical methods [3].

The library also provides support for the definition of non-ideal emitters and physical detectors. Detectors can also be configured to establish various conditions for post-selection in the circuit. Measurements provide detection statistics via probability outcomes and density matrices. We will present details of the library software structure and how the different imperfections are dealt with to provide a meaningful set of outcomes for arbitrary circuit definitions and initial states.

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References

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