

Simplified Quantum Optical Stokes observables and Bell's Theorem

We introduce a simplified form of Stokes operators for quantum optical fields that involve the known concept of binning. Behind polarization analyzer photon numbers (more generally intensities) are measured. If the value obtained in one of the outputs, say H , is greater than in the other one, V , then the value of the simplified Stokes operator is, say, 1, otherwise it is -1. For equal photon numbers we put 0. Such observables do not have all properties of the Stokes operators, but surprisingly can be employed in Bell type measurements, involving polarization analyzers. They are especially handy for states of undefined number of photons, e.g. squeezed vacuum. We show that surprisingly they can lead to quite robust violations of associated Bell inequalities. For more information please have a look on our arXiv:2112.00084.