# Can the Human Eye Detect Two-Photons Entangled State?

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In a recent article [1], an entanglement witness was developed to discover whether or not the human eye can detect bipartite photonic entanglement. For this purpose, an interferometry setup was proposed, where the low photon numbers are amplified using coherent state generators before the detection by the human eye. We ask and explore if the coherence generation can increase the quantum noise and hinder the generalization of the setup to higher-order entanglement detection. We find that the quantum noise can be significant to get conclusive results for higher-order entanglement, but the situation can be remedied by using an amplitude squeezing operation instead of coherence generation before detecting the photons by the eye. We also consider quadrature squeezing relative to the amplitude squeezing before the detection and find the latter is more successful [2]. Using the setup in the experiment [1], we explore if the human eye can detect two-photon entanglement. To simulate the associated psychophysical experimental scenario based upon the generalized interferometer and two-photons entanglement witness, we use a machine learning model of human subjects to be interrogated as photodetectors. Our simulations and their analysis conclude that psychophysical experiments can be used to probe two-photon entanglement.

**References**

[1] V C Vivoli, P Sekatski and N Sangouard, Optica **3**, 473 (2016)

[2] L Gassab and Ö E Müstecaplıoğlu, in preparation