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Using Quantum Optics to Prove the Existence of Photons PRESTON ALEXANDER, SCOTT BALDWIN, S. BLANE MCCRACKEN, R. SETH SMITH, Francis Marion Univ, FRANCIS MARION UNIV COLLABORATION — During the past two years, a Quantum Optics Laboratory was constructed and tested at Francis Marion University. A spontaneous parametric downconversion source was used to create pairs of correlated photons for use in single photon tests of quantum mechanics. In this experiment, the existence of photons was proven by using a spontaneous parametric downconversion source and a three-detector measurement setup. The two beams emanating from the downconversion crystal are referred to as the signal and idler beams. Detector A was placed in front the idler beam. The signal beam was sent to a 50/50 beam splitter, in which the reflected beam was sent to detector B and the transmitted beam was sent to detector B$'$. If photons exist, then these quanta of light energy are indivisible and can only be reflected or transmitted by the beam splitter, but not both. In other words, a photon cannot be divided into two equal halves by the beam splitter. If a simultaneous pair of downconverted photons can only be detected by detector A and either detector B or detector B$'$, but not both, this means that the photon could not be divided. The details of the experimental setup and the results will be presented.

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