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*Quantum Entanglement of Photons Via Spontaneous Parametric Down Conversion in a KD*P Crystal*

Modern communication networks used for financial data, medical records, and election voting are not secure. Stealth technology reduces the effectiveness of our RADAR systems used in national defense. Quantum entanglement applications in communication networks can provide complete security. RADAR using quantum entanglement can detect all stealth technology. My project demonstrated the creation of photon pairs that were quantum entangled. The purpose of this experiment is to observe Quantum Entanglement (QE) via Spontaneous Parametric Down Conversion (SPDC) in a Potassium Dideuterium Phosphate (KD*P) crystal. The hypothesis for this experiment is that due to the conservation of energy and momentum: 1) Entangled photons generated by SPDC will have twice the wavelength of the pump laser. 2) The entangled photons will result in a ring image. Also, the image captured by a camera will get brighter the longer the camera is exposed. The independent variables are 1) the amount of time the camera is exposed and 2) if the KDP crystal is in place. The dependent variable is the wavelength of light that exits the crystal. The results show that quantum entanglement via SPDC did occur. 1) Down converted photons of twice the laser wavelength were detected, showing conservation of energy. 2) Images showed a ring of captured photons showing conservation of momentum. 3) Longer exposures resulted in brighter images. This project shows that quantum entangled photons can be generated using minimal equipment and cost. This has direct applications in secure communication and national defense.