

Abstract Submitted
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Constructing a Faraday Filter for use in quantum entanglement by four-wave mixing¹ DONNA TAYLOR, Weber State University, IRINA NOVIKOVA, College of William & Mary — In order to separate entangled and non-entangled photon streams, we have constructed two Faraday rotation filters by placing a vapor cell between two crossed polarizers. One filter had a natural abundance Rubidium cell and the other had a Rubidium-87 cell. Current run through a solenoid around the vapor cell induces a magnetic field, which causes the two components to propagate at slightly different speeds. This introduces a phase shift that splits the components of the beam and rotates the orientation of the linear polarization. The optical frequency of light transmitted through the filter can then be adjusted by controlling the current through the solenoid around the cell. This control may be fine-tuned well enough for use in high precision applications such as four-wave mixing to produce quantum entanglement. We measured 360 degrees of rotation of polarization with a magnetic field of 26G. We also studied the quantum noise of the optical field transmitted through the filter.

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