

Abstract Submitted
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Hardy's test for local realism QUYNH NGUYEN, AURELIO DREGGI, University of Minnesota — We demonstrated the violation of Bell inequality using entangled photons produced by spontaneous parametric down-conversion. The experiment is based on a local realism test originally proposed by Lucien Hardy. Polarized entangled photons is produced in down-conversion through a pair of beta barium borate crystals. Polarization is adjusted by half wave plates and quartz plates. Single photons travel down two separate paths, each pass through a half-wave plate and a broad band polarizing beam splitter. Light from the beam splitter is collected by lens and focused into optic fibers that direct light into a single photon counting module. Coincidence counting is done using time-to-amplitude converter/single-channel-analyzer units. The probabilities in Bell-Clauser-Horne inequality is calculated by the ratio of the measured coincidence counts on the transmitted laser beams to the total number of coincidence. The counting is done by a LabVIEW program. We find the data to violate local realism by 30 standard deviation. The experiment is based on straight forward quantum mechanical calculations and experimental techniques more accessible to undergraduate students than other methods of testing Bell inequalities.

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