

Ekkasit Sakatok 2010: Characterization of Entanglement Photons Generated by Spontaneous Parametric Down Conversion Pulse Source. Master of Science (Physics), Major Field: Physics, Department of Physics. Thesis Advisor: Assistant Professor Surasak Chiangga, Dr.rer.nat. 102 pages.

This research studied the polarization entanglement of photon pairs which generated by spontaneous parametric down-conversion process in nonlinear crystals beta barium borate ($\beta - BaB_2O_4$). The diode laser 405 nm modulated by rectangular signal from function generator was used as a pump source. Two $\beta - BaB_2O_4$ crystals were cut for type-I phase matching each dimension of $5.0 \times 5.0 \times 0.5 \text{ mm}^3$ were placed face-to-face with the optic axis made 90° to each other. The phase difference occurs from different of speed of light in crystals could be compensated by using half-wave plate and quarter-wave plate both are quartz. The polarization state of the system described above was $|\phi^-\rangle = (|HH\rangle - |VV\rangle)/\sqrt{2}$. The polarization correlation between photon pairs was a sine function with the visibility of 93%. The entanglement between photons was measured by violation of Bell's inequality in Clauser-Horne-Shimony and Holt version. We found that the Bell parameter $S = 2.55 \pm 0.046$ which is 12 standard deviation higher than the classical allowed $|S| \leq 2$. Therefore, the polarization of photon pairs was in quantum regime.

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