INVESTIGATING SINGLE PHOTON INTERACTION PRODUCED BY TYPE II SPDC

Sunday, 15 September 2019 11:45 (15 minutes)

INTRODUCTION-

SPDC is a nonlinear instant optical process that converts one photon of higher energy (namely, a pump photon), into a pair of photons (namely, a signal photon, and an idler photon) of lower energy, in accordance with the law of conservation of energy and law of conservation of momentum. It is an important process in quantum optics, for the generation of entangled photon pairs, and of single photons.

METHOD OF PHOTON INTERACTION EXPERIMENT-

The main goal of photon interaction experiment is to collide two photons at specific point in space and time exploring the particle nature of light and to reveal new information about the very nature of photons. The goal of photon collision is accomplished using β barium borate crystal which produces a pair of entangled photons using spontaneous parametric down-conversion (SPDC) process which are to be collided.

INFERENCES OF THE EXPERIMENT-

The main inference that can be drawn from the results of the experiment is to explain how the photons can

This interaction between the photons collision will help us to know and clarify our understanding of photo

CALCULATION OF COLLISION POINT-

x=a cosθ, y=l_1+b sinθ (for one of the ellipse)
x=c cos∅, y= 〚-1〛 _2+ d sin∅ (for second ellipse)

∅= 〚sin〛 ^(-1)[(da/bc)± √((〚da/bc〛 ^2-4[〚{l〛 _1+l_2+b^2- 〚(bc/a)〛 ^2}/ 〚(bc/a)〛 ^2])]

θ = c/a cos[〚sin〛 ^(-1)[(da/bc)± √((〚da/bc〛 ^2-4[〚{l〛 _1+l_2+b^2- 〚(bc/a)〛 ^2}/ 〚(bc/a)〛 ^2])]]]

REFERENCES-

1) Effect of high dimensional entanglement of Laguerre – Gaussian modes in parametric down conversion in j

2) Constraining the photon lifetime in physical review letters (July 2013) by Julian Heeck (Max Planck in

3) The mass of the photon (compilation of 130 research papers), by Liang-Cheng Tu1, Jun Luo and George