Accelerating Entangled Photons

P H Souto Ribeiro[1], R C Souza Pimenta[1], G H dos Santos[1], A B Barreto[2], and L C Celeri[3]

[1]*Physics, Federal University of Santa Catarina, Florianópolis/SC, Brazil*
[2]*Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul , Caxias do Sul, Brazil*
[3]*Departamento de Física, Universidade Federal de Goiás, Goiânia, Brazil*
Contact Email: phsr3773@gmail.com

Spontaneous Parametric Downconversion (SPDC) is a natural source of entangled photon-pairs, which are quantum correlated in their trasnverse spatial degrees of freedom. The entanglement between two SPDC photons can be witnessed by measuring coincidence counting distributions in the far and in the near fields, and testing the product or sum of the variances of these distributions against un upper bound. The result being below the bound means non-separability. In this work, we analyze the entanglement between two photons form SPDC, when one of the photons is accelerated. We use the term acceleration in this context in the same sense as Berry and co-workers referring to non-spreading Airy wavepackets. We use a spatial light modulator (SLM) to couple one photon to an Airy optical wavepacket. This makes it undergo a curved trajectory, equivalent to an accelerated particle. We observe experimentally that entanglement is preserved.

References

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