Journal of Aeronautics & Aerospace Engineering
ISSN: 2168-9792
OPEN ACCESS Freely available online
Commentary

The Interactivity between Space-Based Flight and the Photon System

Keith Hearon*

Department of Basic Research, Instituto de Investigación Sanitaria de la Fundación Jiménez Díaz, Madrid, Spain

DESCRIPTION

A device for generating and monitoring correlated photon pairs at 35.5 km altitude was successfully tested in near-space conditions, as reported here. The results of the high altitude and ground-based qualification tests show that the device continues to function even in harsh environments. The photon pair system's robust, compact, and power-efficient design is shown.

The deployment of autonomous photon pair systems on low-resource platforms, such as nano-satellites hosting distant quantum key distribution network nodes, is made possible by this design. Tests of entangled photon technology in low earth orbit are now possible thanks to these findings.

An established technology is correlated photon pair sources based on spontaneous parametric down conversion (SPDC). The photon pair correlations' brightness and quality have been steadily rising ever since pioneering demonstrations. The generation of photon pairs described by a quantum entangled state is the most common use of SPDC sources.

Interest in quantum communication is largely responsible for current research on SPDC sources. Due to the superior privacy guarantees provided by fundamental quantum mechanics, quantum key distribution (QKD) based on entangled photon pairs continues to garner attention. Optical fiber or free-space links can be used for entanglement distribution, but current fiber technology has a practical distance limit because of loss and decoherence. Because of these limitations, QKD networks that span distances beyond metropolitan areas will rely on free-space links. It is possible to beam entangled photons to receivers far apart by coupling photon pair sources to optical transmitters and placing them aboard high-altitude air or spacecraft. The demonstration of a bright entangled photon pair source in low earth orbit (LEO) would be a significant step in the direction of ongoing research on planet-wide entanglement distribution using spacecraft.

Nanosatellites-small spacecraft may be used to demonstrate an entangled photon source in low-earth orbit at a low cost. Due to its short design cycle, use of commercially available components, and common deployment mechanism, the CubeSat standard is particularly appealing. CubeSats can be stacked to make larger spacecraft, and the standard unit is a 100 mm cube that weighs 1 kg (or 1U).

The limited supply of resources is one drawback of using CubeSats. A typical 1U CubeSat's form factor (100 × 100 × 30 mm^3), mass (300 gm), and power supply (two W continuous) all limit the payload. Mechanical vibration experienced during a rocket launch, a lack of radiation shielding, potential thermal fatigue caused by a lack of insulation, and limited power for temperature regulation are additional obstacles.

For the purpose of generating and keeping track of polarization correlations between photon pairs, we created a compact, robust, and power-efficient system in response to these difficulties. The system is contained within a device whose dimensions and power requirements are comparable to those of a 1U CubeSat's payload capacities. Optics and electronics subsystems are tightly integrated within the package. Photon pair counting experiments can be carried out with complete automation thanks to the electronics division's comprehensive infrastructure.

Based on type I collinear SPDC, the source produces photon pairs with classical correlation in a single crystal. Strong classical correlation between photon pairs is all that is needed to validate the essential parameters of ruggedness and power efficiency. The ability to generate polarization entangled photon pairs can be added to the design if it can accommodate a basic SPDC source.

Correspondence to: Keith Hearon, Department of Basic Research, Instituto de Investigación Sanitaria de la Fundación Jiménez Díaz, Madrid, Spain; E-mail: hearon222@gmail.com

Received: 08-Jul-2022, Manuscript No. JAAE-22-21615; **Editor assigned:** 11-Jul-2022, PreQC No: JAAE-22-21615 (PQ); **Reviewed:** 26-Jul-2022, QC No: JAAE-22-21615; **Revised:** 02-Aug-2022, Manuscript No: JAAE-22-21615 (R); **Published:** 09-Aug-2022. DOI: 10.35248/2168-9792.22.11.289.

Citation: Hearon K (2022) The Interactivity between Space-Based Flight and the Photon System. J Aeronaut Aerospace Eng. 11: 289.