

Towards an observation of decoherence of entangled-photons

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GPPU Experimental Point (GEP): 4

Goal of Study

In this course, you will learn about single near-infrared photon detection, fiber-based optomechanics and the well-known strange phenomenon in quantum mechanics.

Contents

The ultimate goal of this project is to observe ‘wavefunction collapse’ of photon polarization by decoherence of the entangled-photon. The equipments to be used are a polarization entangled 1550 nm photon Source, single-photon avalanche diode and fiber optomechanics etc.

In this year, we aim

1. to detect single 1550 nm-wavelength photon
- and
2. construct a fiber-based polarization beam splitter and to confirm the entanglement of two photons from the source

Textbook and References

<https://doi.org/10.1016/j.chip.2022.100005>
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=3161&pn=PFS-FFT-1X2-1550
https://www.ozoptics.com/ALLNEW_PDF/DTS0184.pdf

Progress Schedule

- ✧ Day 1
Lecture 1: single photon avalanche diode (SPAD) and its read out
Experiment 1: operation of SPAD
- ✧ Day 2
Experiment 2: detection of near infrared single photons
- ✧ Day 3
Experiment 3: construction of a fiber-based polarization beam splitter
- ✧ Days 4
Experiment 4: confirmation of the entanglement of two photons from the entangled two-photon source

Other Details

Course Period	2023 Summer
Place	Physics & Chemistry Annex 1 st floor
Number of Students	1—4
Evaluation method	The evaluation method will be based on the discussion during the experiment (70%), and the presentation or report after the experiment (30%).

In Addition