

# Towards an observation of decoherence of entangled-photons

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GPPU Experimental Point (GEP): 4

## *Goal of Study*

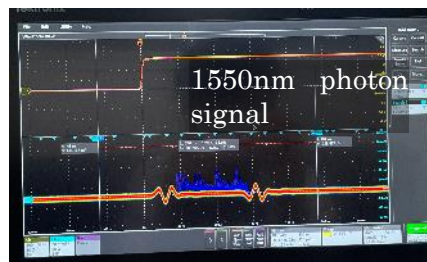
In this course, you will learn about single near-infrared photon detection, fiber-based optomechanics and the well-known strange phenomenon in quantum mechanics.

## *Contents*

The ultimate goal of this project is to observe ‘wavefunction collapse’ of photon polarization by decoherence of the entangled photon. The equipment’s 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 assemble single photon avalanche diode (SPAD) for 1550 nm photon detection
2. to start up a polarization-entangled 1550 nm-photon source
3. 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.thorlabs.com/newgrouppage9.cfm?objectgroup_id=3161&pn=PFS-FFT-1X2-1550)  
[https://www.ozoptics.com/ALLNEW\\_PDF/DTS0184.pdf](https://www.ozoptics.com/ALLNEW_PDF/DTS0184.pdf)

## *Progress Schedule*

- ✧ Day 1  
Lecture 1: single photon avalanche diode (SPAD) and it's read out  
Experiment 1: operation of SPAD
- ✧ Day 2  
Experiment 2: start up a polarization-entangled 1550 nm-photon source
- ✧ 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***

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

***In Addition***

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