

# Towards an observation of wave function collapse of entangled photons

Instructors: Dr. Atsuko K. Ichikawa (atsuko.ichikawa.c6\_at\_tohoku.ac.jp),  
Dr. Yosuke Ashida (yosuke.ashida.a1\_at\_tohoku.ac.jp)  
(Physics & Chemistry Annex 1<sup>st</sup> floor)  
GPPU Experimental Point (GEP): 4

## *Goal of Study*

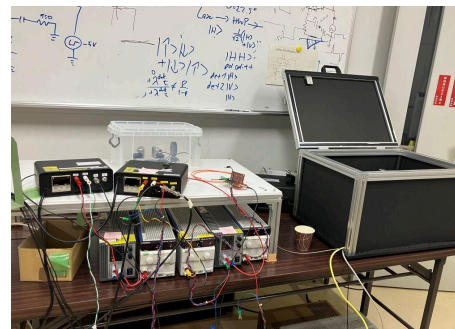
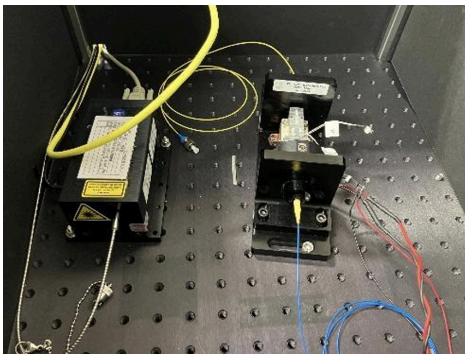
In this course, you will learn about single near-infrared photon detection, fiber-based optomechanics and the well-known strange phenomenon in quantum mechanics such as quantum eraser.

## *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 confirm entanglement of two photons using polarization beam splitters
3. and to construct interferometers



## *Textbook and References*

[https://en.wikipedia.org/wiki/Spontaneous\\_parametric\\_down-conversion](https://en.wikipedia.org/wiki/Spontaneous_parametric_down-conversion)  
“Double-slit quantum eraser”, doi.org/10.1103/PhysRevA.65.033818

## *Progress Schedule*

- ✧ Day 1  
Lecture 1: single photon avalanche diode (SPAD) and its read out  
Experiment 1: operation of SPAD
- ✧ Day 2  
Cont. of Day 1's experiment.
- ✧ Day 3  
Experiment 2: confirm entanglement of two photons using polarization beam splitters
- ✧ Days 4  
Experiment 3: construct an interferometer and confirm interference

***Other Details***

<b>Course Period</b>	Summer 2025
<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***

--