



*Graduate Program on Physics for the Universe  
(GP-PU)*

# 宇宙創成物理学 高度実験 GP-PU experimental course

宇宙創成物理学国際共同大学院、  
ニュートリノ科学研究センター

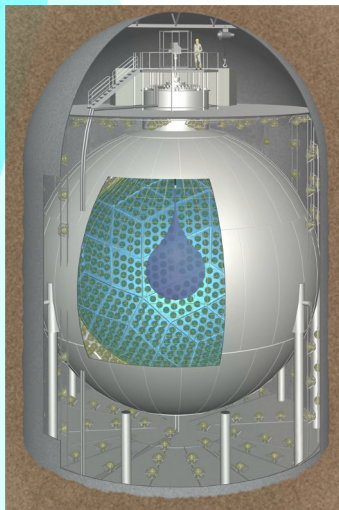
尾崎 秀義

(Hideyoshi Ozaki)

2021/04/13

# Self-introduction

- 尾崎 秀義 (Hideyoshi Ozaki)
- 2008~ Ehime Prefectural Uwajima Higashi high school
- 2011~ Tohoku university
- 2014~ RCNS
- 2020~ Assistant professor of GP-PU, RCNS



Belongs: RCNS

Hobby: Futsal, Ramen, Sake...

KamLAND-Zen: Neutrinoless double-beta decay experiment

# **GPPU compulsory elective course (2 credits)**

**GP-PU Lecture II**  
**(宇宙創成物理学特殊講義II)**

or

**GP-PU experimental course**  
**(宇宙創成物理学高度実験)**

# 高度実験課題の単位取得(How to get credits)

素粒子物理 (~5課題)  
Particle phys. (~5 exps)

原子核物理 (~4課題)  
Nuclear phys. (~4 exps)

天文 (~3課題)  
Astronomy (~3 exps)

Take ~4 or more experiments during the doctoral program.

Grade for each experiment  
(S/A/B/C/D)

  
≥ 13 GEP  
(GP-PU Experimental Points)

**2 credits**

先行(先々行)履修も可能です!  
We also welcome you to take experiments in advance (M1,M2).

**Giving an award to the high achiever students!!**

**GPPU excellent student award 2020**



# List of Experiments

No.	Instructor	Title	GEP	期間 (days)	受入数 Cap.	comment
P1	池田	Geant4シミュレーションの科学	3	3-4	~5	
<del>P2</del>	<del>石川</del>	<del>ASIC講習会</del>	<del>3</del>	<del>-</del>	<del>-</del>	Cancelled
P3	石徹白	超電導検出器入門	4	2-3	~2	Odd years
P4	清水	シンチレーション測定器開発	4	4	2~4	Even years
P5	市川 中村	SiPM読出し回路の開発	4	4	1~3	New
P6	岸本	素粒子・天文学物理のためのマイクロ波技術	4	4	1~3	New
N1	石徹白 三輪	FPGA講習会	3	4	~20	
N2	三輪	多チャンネルMPPCを用いた シンチレータアレイの読み出し	4	4	~4	
N3	金田	データ収集系の理解・構築、及び 検出器製作技術とデータ解析の基本	4	4	~6	
<del>N4</del>	<del>伊藤</del>	<del>サイクロトロン加速器を使った散乱実験</del>	<del>4</del>	<del>4</del>	<del>2~6</del>	Cancelled
A1	秋山	観測光学系の収差測定実験	4	4	~4	
A2	服部	ミリ波フーリエ分光実習	4	4	~3	
A3	服部	CMB 温度測定(仮)				TBD (new)

<http://lambda.phys.tohoku.ac.jp/gppu/exp/syllabus.html>

# Registration

## Registration of experiments

Registration (by sending e-mail) is required every year to take experiments.

## Course registration

Registration is required only the final year (D3) for credits.

# GP-PU homepage

<http://gp-pu.tohoku.ac.jp/>





# GP-PU experimental course homepage

<http://lambda.phys.tohoku.ac.jp/gppu/exp/>

**GP-PU Experimental Course** HOME ABOUT CONTENTS

GP-PU Experimental Course  
高度実験

**Contents**

<b>GP-PU Student</b> How to get credits	<b>Other Student</b> How to participate classes
<b>Syllabus</b> Introduction of contents	<b>Gallery</b> Photographs in the course
<b>Staff page</b> Working group	<b>Links</b> Going to related pages



# Syllabus

<http://lambda.phys.tohoku.ac.jp/gppu/exp/syllabus.html>

GP-PU Exp.  
Course Syllabus

HOME PARTICLE physics NUCLEAR physics  
ASTRONOMY

## Syllabus 2021

In the Japanese fiscal year of 2021, there are ten courses that you can select,

- A1 (Dr. Akiyama, March 2022)
- A2 (Dr. Hattori, Summer 2021)
- A3 (Dr. Hattori)
- N1 (Drs. Ishidoshiro and Miwa, November 2021)
- N2 (Dr. Miwa, August - September 2021)
- N3 (Dr. Kaneta, Second semester)
- N4 (Dr. Itoh, Canceled)
- P1 (Dr. Ikeda, Second semester)
- P3 (Dr. Ishidoshiro, February - March 2022)
- P4 (Dr. Shimizu, Held in even-numbered financial years)
- P5 (Drs. Ichikawa and Nakamura, Summer 2021)
- P6 (Dr. Kishimoto, Summer 2021)

Archive:  
2020 , 2019

Syllabuses can be downloaded below:

Particle Physics

**P1 (GEP=3): Geant4 simulation science**  
Instructor: Dr. Haruo Ikeda ([ikeda\\_at\\_awa.tohoku.ac.jp](mailto:ikeda_at_awa.tohoku.ac.jp), RCNS Annex I 03 room 122)

GPPU Experimental Course

P1 (GEP=3)

### Geant4 Simulation Science

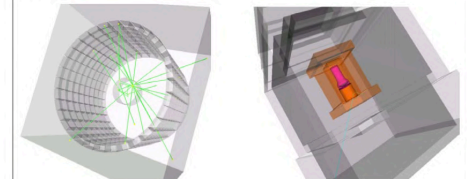
Instructor: Haruo Ikeda ([ikeda@awa.tohoku.ac.jp](mailto:ikeda@awa.tohoku.ac.jp), RCNS Annex I 03 room 122)  
GPPU Experimental Point (GEP): 3

#### Goal of Study

Geant4 is a toolkit for the simulation of the passage of particles through matter. Its areas of application include high energy, nuclear and accelerator physics, and low energy, neutrino and dark matter physics. This course will cover the toolkit from basic coding through advanced topics. The goal of this study is students will make their own Monte Carlo simulation for their physics detectors.

#### Contents

This class will give a basic overview on the main characteristics of the Geant4 Monte Carlo toolkit. Theoretical lessons will be coupled to practical exercises that will give the possibility to the student to move the first steps with the code, from the installation, to the run of a simple application. GPPU prepares a laptop linux PC with geant4 installation. Students will learn basic geant4 coding method (running geant4, geometry construction, primary particles definition, physics lists definition and scoring results) with lectures, write simple example codes by themselves, and analyzing the Monte Carlo results. Finally, students will make simple Monte Carlo simulation and present their simulation results. This class will help students to make and analyze their own Monte Carlo simulations.

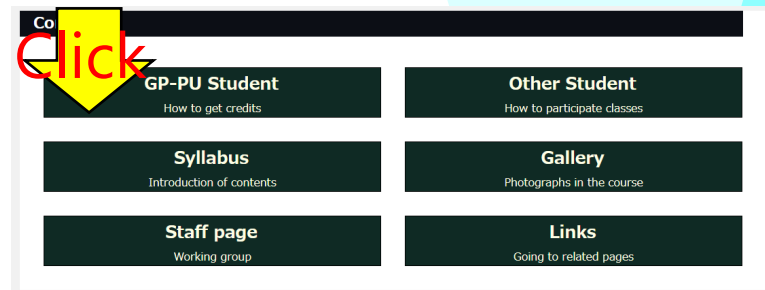


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# How to register for the experiments

<http://lambda.phys.tohoku.ac.jp/gppu/exp/students.html>

Please send an e-mail to  
([ozaki@awa.tohoku.ac.jp](mailto:ozaki@awa.tohoku.ac.jp))  
Ozaki.



## Example

Title: GP-PU Experimental Course (*Your name*)

Text: first(2, A1, N1, P1, N2), second(1, P3, N3, A2, P4)

**Order of your choice** (until 4th)

**# of experiments you would like to take in the semester**

Please register by **mid-May** every year.

**This year's deadline is 5/10.**

# Notes

- If the number of applicants exceeds the capacity, we decide who take which experiments randomly.
- Each instructor of the experiment will contact (send an e-mail) to discuss details of the experiment (schedule etc.).
- **By the end of D2, please obtain 13 GEP or more.**
- Please take at least one experiment each year.
- Please take experiments in advance (M1, M2).

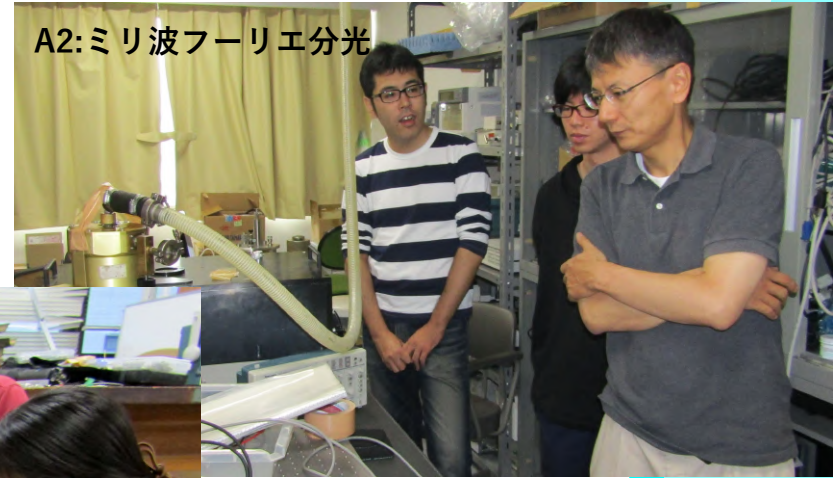
# At last

We hope that you will learn advanced experimental technologies and a comprehensive view.

A1: 観測光学系の収差測定実験



A2: ミリ波フーリエ分光



N2: MPPCを用いたシンチレータの読み出し

P2: ASIC講習



P4: シンチレーション測定器

