

## **Knowledge and skills for scattering experiments**

### **using a cyclotron accelerator**

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GPPU Experimental Point (GEP): 4

#### ***Goal of Study***

The aim of this course is to acquire basic knowledge and skills for scattering experiments in accelerator facilities. In experimental particle and nuclear physics, recent projects become large and complex. Therefore, students hardly understand and handle all experimental apparatuses. This course offers you the opportunity. The experience will help you to draw up a specific project in future.

#### ***Contents***

Tohoku University has a good environment to study experimental nuclear physics because there are various accelerators in the campus. K=110 MeV AVF cyclotron in CYRIC offers you an opportunity to learn the basic knowledge and the skills.

In this course, after taking some lectures to learn principles of the accelerator (ECR ion source, AVF cyclotron), detectors (DSSD, IC, Scintillator), and data acquisition system (VME, ROOT, C/C++), you will participate in an experiment, the purpose of which is searching for new alpha cluster states in excited states of nuclei. By analyzing the scattering data, you will experience the extraction of the physical quantities. In addition, you may find a new cluster state.



#### ***Textbook and References***

- [1] Sector focusing cyclotrons: J. R. Richardson, *Progress in Nuclear Techniques and Instrumentation*, North-Holland Publishing Co. (1965).
- [2] Radiation Detection and Measurement: Glenn F. Knoll, Wiley (2000).
- [3] <http://www.cyric.tohoku.ac.jp/kenkyu/kasoku.html>

***Progress Schedule***

- ◇ Day 1-2  
Lecture: accelerator, detectors, data acquisition system
- ◇ Day 3-4  
Practice: scattering experiment, analysis, discussion, presentation

***Other Details***

<b>Course Period</b>	4days in H2 academic year
<b>Place</b>	Cyclotron and Radioisotope Center (CYRIC)
<b>Number of Students</b>	2—6
<b>Evaluation method</b>	The evaluation method will be based on the discussion during the experiment (50%), and the presentation after the experiment (50%).

***In Addition***

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