Nishina School 2019
Introduction of Program

Hironobu Ishiyama

★Participant

- Peking University (5 students + 1 supervisor)
- Seoul National University (5 + 1)
- University of Hong Kong (5 + 1)
- Philips Exeter Academy (4 + 1)
- Tohoku University (1)
- Rikkyo University (2)

22 students

★ Objectives

Experimental nuclear physics

★ Program 2019

$^{12}C(p, \gamma)^{13}N/^{10}B(p, \alpha)^{7}Be$ reaction experiments with training and lectures

Objectives (for staff scientist)

1. **Educational research using RIKEN's accelerators**
2. **Establishment of a basic course on nuclear physics**
3. Collaborative development of detectors and other experimental apparatus for educational research
4. Joint seminars
5. Other educational research and programs agreed to by both parties

Objectives

★ Introduction to **nuclear physics EXPERIMENTS**
on the site of the RI Beam Factory at RIKEN
- one of the world leading facilities in the field of nuclear physics
giving a flavor of research frontier

★ We **hope** you to enhance motivation toward nuclear research,
nuclear physics laboratories in your university

Program 2019

Focus: $^{12}C(p, \gamma)^{13}N/^{10}B(p, \alpha)^{7}Be$ reaction experiments with proton beams

A typical nuclear reaction – “beam and target”
Nuclear resonant states
Nuclear astrophysics and/or nucleosynthesis

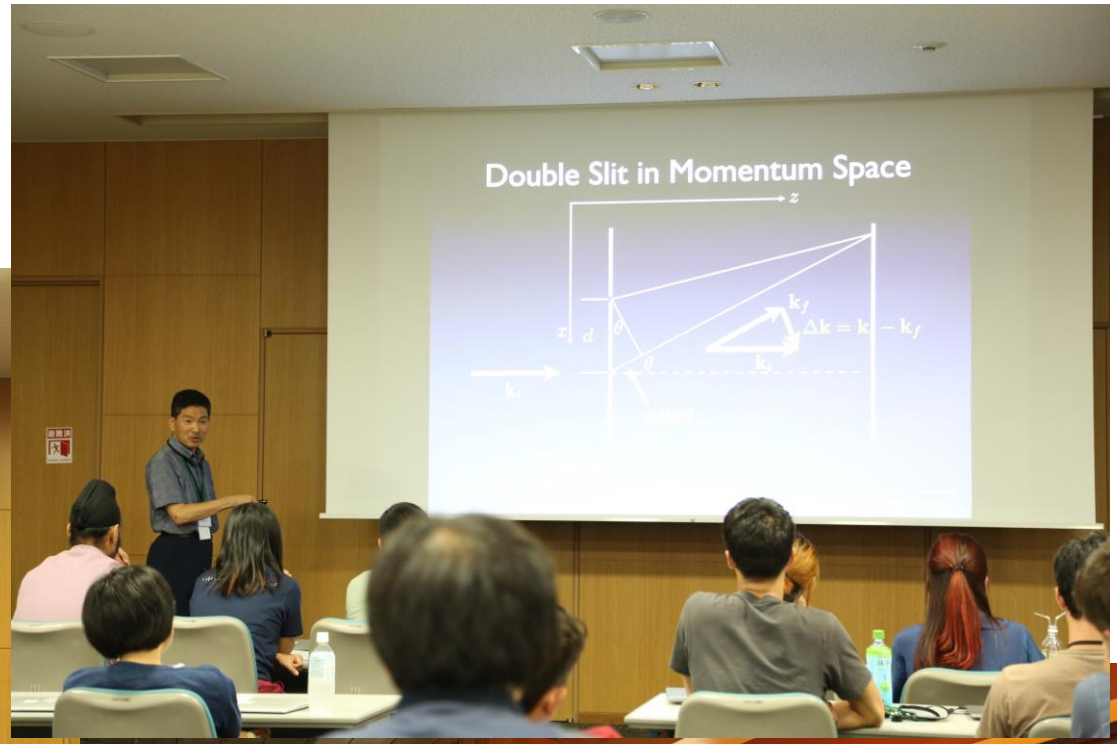
<1st week>

July 30: opening, introductions, network security, 1 lecture
July 31: RIBF Tours, 2 lectures, 2 training programs, **party**
Aug. 1: 1 lecture, 1 training program, group works for experiment (6 groups)
Aug. 2: 1 lecture, group works for experiment

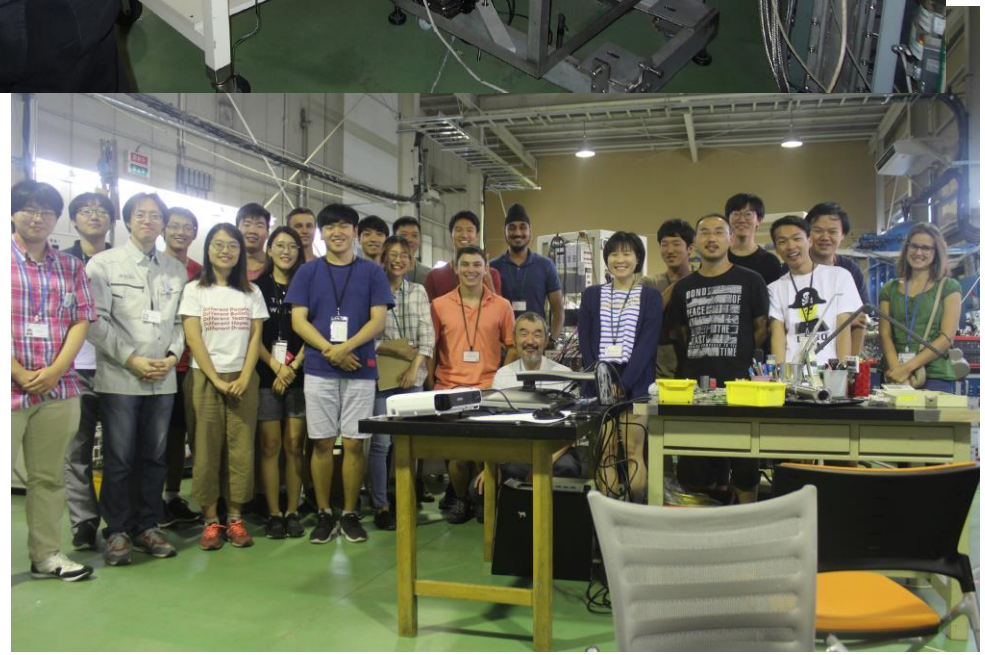
<2nd week>

Aug. 5: preparation for experiment
Aug. 6: reaction measurements with proton beams
Aug. 7: auxiliary measurements, data analysis, preparation for presentation
Aug. 8: No specific program (analysis, preparation for presentation, free time)
Aug. 9: presentation by each group, summary, **Farewell party**

Last year

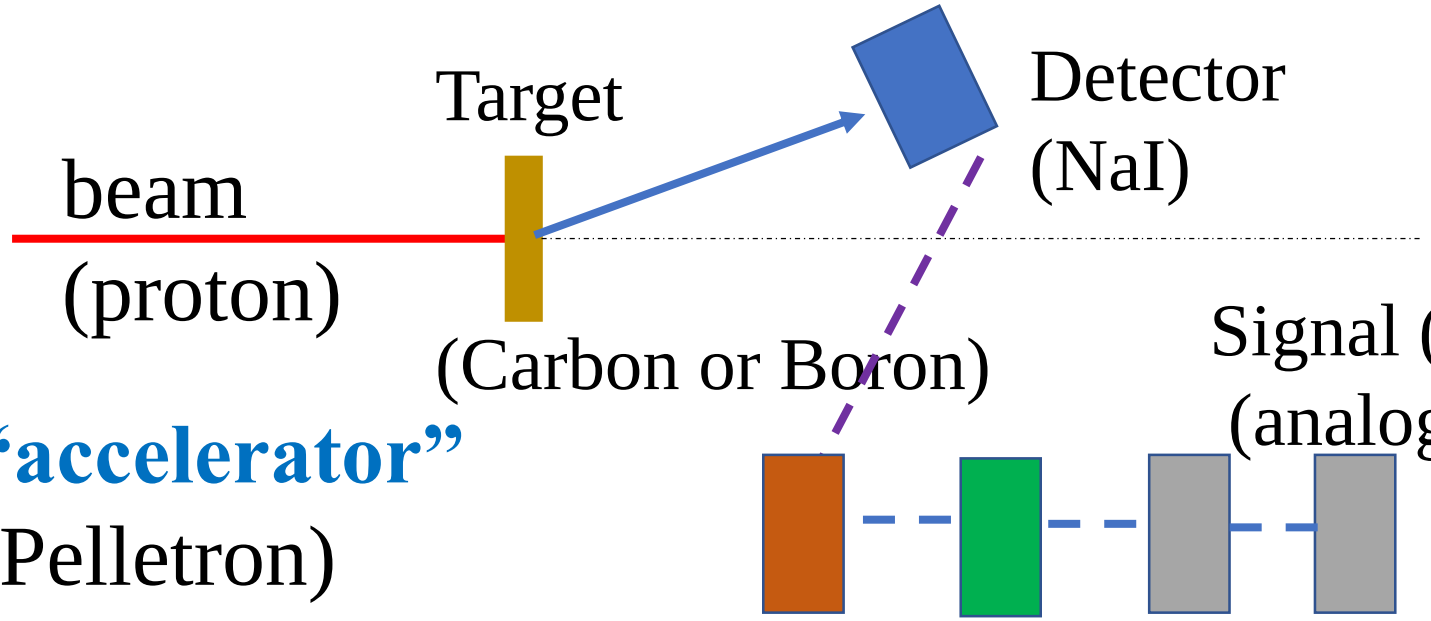



last year



A typical scheme of reaction experiments

Nuclear reaction study with energetic beams

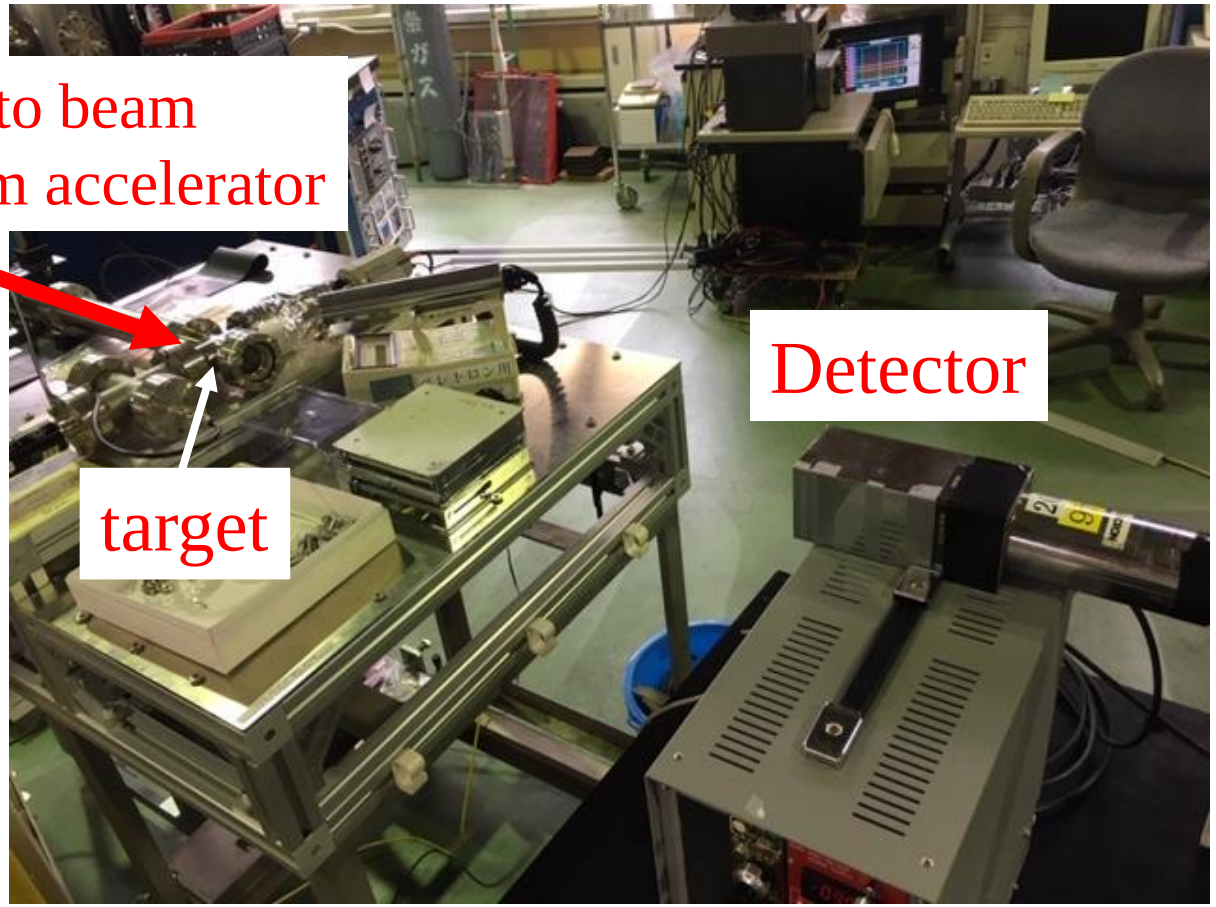


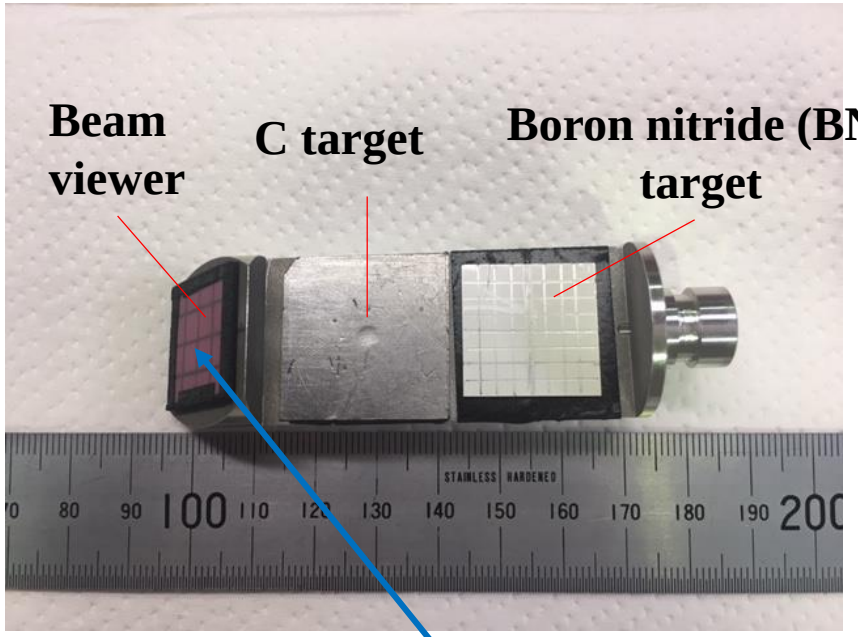
“beam and target”
Since Rutherford scattering

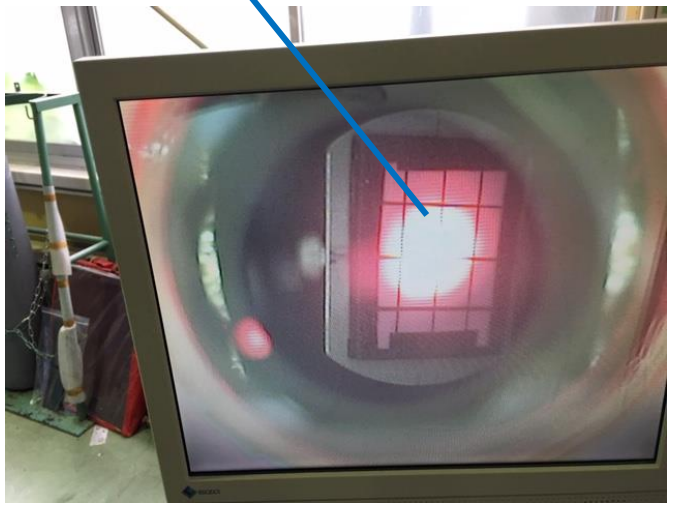
Signal (information) processing
(analog – digital – data – **knowledge**)

“accelerator”
(Pelletron)

Amplitude, time, … ⇒ energy, speed, PID, …
⇒ cross section
structure of nucleus
nucleosynthesis in stars


Proto beam
from accelerator
target
Detector


Beam
viewer
C target
Boron nitride (BN)
target



6 groups for experiment

1. $^{12}C(p, \gamma)^{13}N$ exp. (in-beam), Ep = 1 MeV
2. $^{12}C(p, \gamma)^{13}N$ exp. (activation), Ep = 1 MeV
3. $^{12}C(p, \gamma)^{13}N$ exp. (in-beam), Ep = 2 MeV
4. $^{12}C(p, \gamma)^{13}N$ exp. (activation), Ep = 2 MeV
5. $^{10}B(p, \alpha)^{7}Be$ exp. (in-beam), Ep = 2 MeV
6. $^{10}B(p, \alpha)^{7}Be$ exp. (activation), Ep = 2 MeV

Some notes

Be careful:

high-voltage, radiation, … Follow the instructions.
in general, we less protected than in our daily life
from damages…
forbidden – use of “ pier to pier” (P2P) file sharing software

Note taking #log-note for each grop

Discussion in the team

Network connection : through “guest” with pass wd: rikenwlanguest

Our web page: https://indico2.riken.jp/event/3068/

Personal

Lectures, Training and experiments

Seonhoo Choi, Jing Wu, Sidong Chen, Kanenobu Tanaka, Tokihiro Ikeda,
Hiromi Sato, Takao Kojima, Sun Iimura, Jiajian Liu, Wenduo Xian,
Yeung Tik Tsun

Logistics and …

Yu Naya, Tomomi Okayasu, Midori Yamamoto, Yuri Tsuburai, Yunike Shimizu,

Hideki Ueno (chair of Nishina school committee)
Hideto En'yo, Hideyuki Sakai (Nishina school committee)
Tohru Motobayashi, Hironobu Ishiyama ("school master")