Department of Technical Physics and Nishina School

Jing Wu

School of Physics, Peking University

Nishina School, RIKEN, Japan, July 30th 2019

2008


2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

Main contents

- General Introductions of Department of Technical Physics
- Collaboration with RIKEN
- Feedbacks to Nishina School

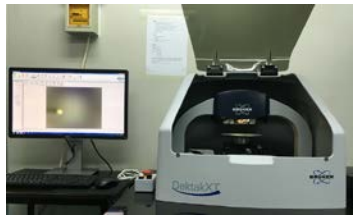
General Introduction

- Department of Technical Physics was founded in 1955 as the flagship basement in China to foster talents in nuclear science and related fields. Since the year of 2001, only the part of Particle Physics and Nuclear Physics has been remained in the department due to the re-structure of departments in PKU.
- The department enrolls about 18 doctoral students every year.

A: Physics Building
B: Accelerator Building
C: Jiwu Building

Over 8,000 m²

Facilities and Labs



Applied Nuclear Physics Lab

- The department is the leading part of the State Key Laboratory of Nuclear Physics and Technology, equipped with a facility of 2X1.7MV tandem accelerator for applied nuclear physics and a subatomic particle detection laboratory for basic research.

Subatomic Particle Detection Lab

Faculty

- The total of 28 current faculty members:
  - 8 Full Professors
  - 3 tenured Associate Professors
  - 2 tenure-track Assistant Professors
  - 7 Associate Professors
  - 1 Professorship Engineer
  - 1 Senior Engineers
  - 5 Engineers
  - 1 Lecturer
- publish more than 40 SCI peer-reviewed papers per year, including high-impact journals such as PRL, JHEP and PR series journals

Prof. Yuanning Gao

Dean of School of Physics (2018-), Director of State Key Lab. Nuclear Physics and Technology (2018-), Vice president of High Energy Physics Association of China

Prof. Yanlin Ye

Chair of the Asian Nuclear Physics Association (ANPhA, 2011-2014), director of the Chinese Nuclear Physics Society (2014-), member of the IUPAP-C12 (2018-), member of program advisory committee (PAC) of RIKEN-RIBF…

Prof. Qiuju Guo

Executive member of Chinese Society of Radiation Protection, One of Chinese representatives in Radiative Protection Committee of World Health Organization

Prof. Jie Meng

Cheuang Kong Professor (Ministry of Education)
Member of GENCO Jury, Chair of Nuclear Structure Division, Chinese Nuclear Physics Society
APS Fellow(2012), Member of the Academy of Europe(2018)

Prof. Furong Xu

director of PKU-IMPCAS (Lanzhou) Joint Center for Nuclear Physics, Managing Director of CUSTIPEN, Board member of ANPhA

Research Groups

- Experimental Nuclear Physics

  -research with Radioactive Nucleus Beams (RNBs)

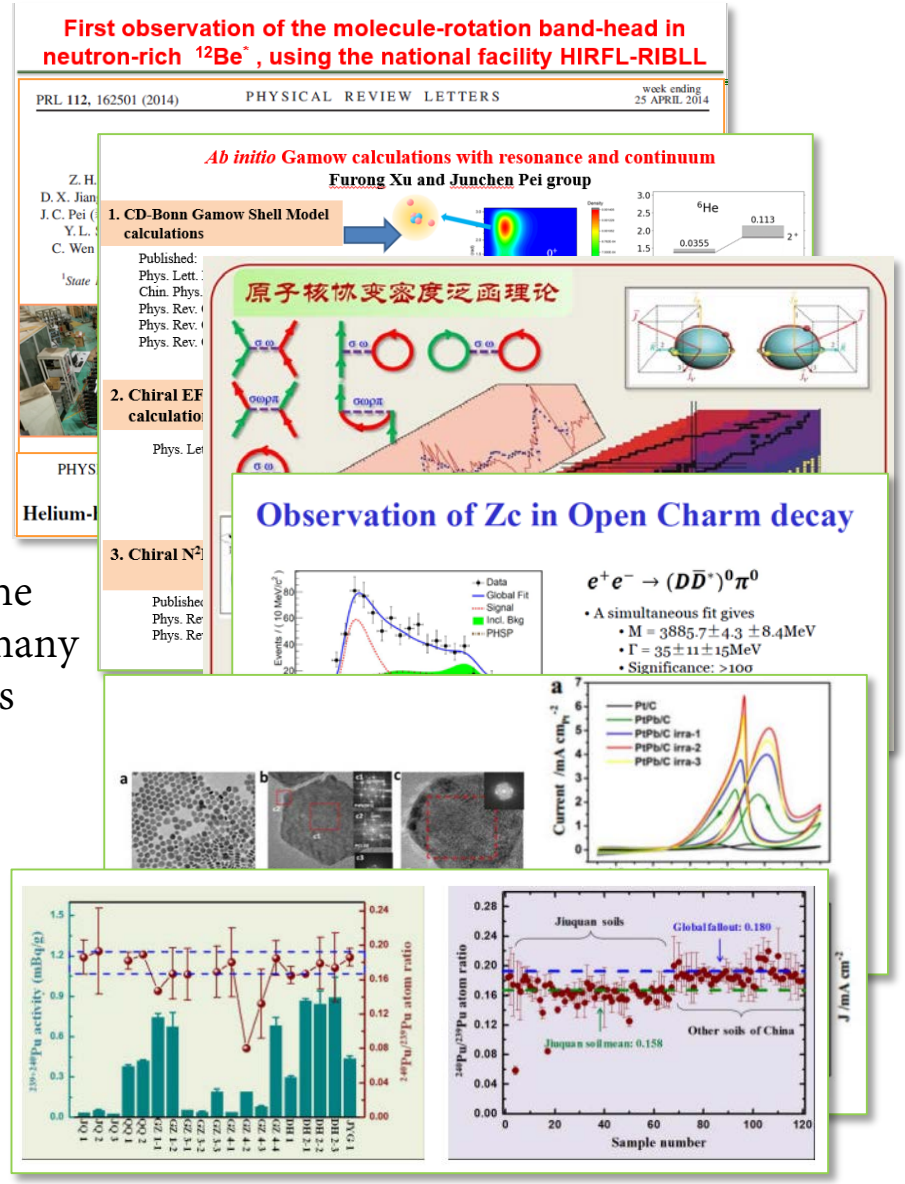
- Theoretical Radioactive Ion Beam Physics

  -developing ab-initio many-body theories for nuclear structure

- Theoretical Nuclear Physics and Astrophysics

  -developing more robust quantum many-body theories for describing the exotic properties in nuclear ground states and excited states, as well as many novel phenomena in the interdisciplinary studies of nuclear astrophysics

- Experimental High Energy Physics
- Ion Beam Materials and Nuclear Materials
- Radiation Protection & Environment Radioactivity



Scientific Collaborations

- CIAE in Beijing
- HIRFL in Lanzhou
- RIKEN, RCNP in Japan
- NSCL in USA
- iThema in South Africa

Experimental and theoretical nuclear physics

- LHC/CMS in Europe
- BEPCII/BESIII in Beijing
- PandaX, BELLE, sPHENIX

High energy physics

- China-US Theory Institute for Physics with Exotic Nuclear (CUSTIPEN) ---- DoE
- A CSC supported postdoctoral "PKU-FRIB Research fellow program" has been established with MSU in US.

Collaboration with RIKEN

- **Joint Graduate School Program** based on agreements and MoU:

Name	Year	RIKEN Host Lab.
Kuoang Li (李阔昂)	2007 - 2009	Radioactive Isotope Physics Laboratory
He Wang (王赫)	2008 - 2012	Radioactive Isotope Physics Laboratory
Ruijiu Chen (陈瑞九)	2009 - 2012	Radioactive Isotope Physics Laboratory
Xiaofei Yang (杨晓菲)	2011 – 2014	Radioactive Isotope Physics Laboratory
Jin Wu (吴锦)	2012 - 2015	Radioactive Isotope Physics Laboratory
Chao Wen (文超)	2013 - 2015	Spin Isospin Laboratory
Sidong Chen (陈嗣栋)	2014 - 2016	Radioactive Isotope Physics Laboratory
Longchun Tao (陶龙春)	2015 - 2017	Radioactive Isotope Physics Laboratory
Shihang Shen (申时行)	2016 - 2017	Quantum Hadron Physics Laboratory
Xiaohui Sun (孙晓慧)	2016 - 2018	Radioactive Isotope Physics Laboratory
Jian Gao (高见)	2017 – 2019	Spin Isospin Laboratory

- **Cooperative research :**

  Prof. H. Sakurai (RIKEN-RIBF), Prof. T. Motobayashi (RIKEN-RIBF), Prof. T. Otsuka (RIKEN-CNS), etc., and their teams.

Study of the halo nucleus ^{6}He through the direct nuclear reactions

Y L Ye[1], D Y Pang[1], G L Zhang[1], D X Jiang[1], T Zheng[1], Z H Li[1], X Q Li[1], Q J Wang[1], Y C Ge[1], C E Wu[1], J Wang[1], Z Q Chen[1], Y Ai[1], A Ozawa[2,3], Y Yamaguchi[2], D Q Fang[2] and I Tanihata[2,4]

[1] School of Physics and MOE Key Laboratory of Heavy Ion Physics, Peking University, Beijing, 100871, People's Republic of China
[2] RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan

J. Phys. G: Nucl. Part. Phys. **31** (2005) S1647–S1653

PHYSICAL REVIEW C **71**, 014604 (2005)

Quasielastic scattering of ^{6}He on ^{9}Be at 25 MeV/nucleon

Y. L. Ye,[1,*] D. Y. Pang,[1] D. X. Jiang,[1] T. Zheng,[1] Q. J. Wang,[1] Z. H. Li,[1] X. Q. Li,[1] Y. C. Ge,[1] C. Wu,[1] G. L. Zhang,[1] Q. Y. Hu,[1] J. Wang,[1] Z. Q. Chen,[1] A. Ozawa,[2,†] Y. Yamaguchi,[2] R. Kanungo,[2] and I. Tanihata[2,‡]

[1]*School of Physics and MOE Key Laboratory of Heavy Ion Physics, Peking University, Beijing, China*
[2]*RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan*

ELSEVIER Nuclear Physics A 834 (2010) 454c–457c
www.elsevier.com/locate/nuclphysa

Probing the Structure of Unstable Nuclei Through the Recoiled Proton Tagged Knockout Reaction*

Y.Ye[a†], Z.Cao[a], D.Jiang[a], T.Zheng[a], H.Hua[a], Y.Ge[a], X.Li[a], J.Lou[a], J.Xiao[a], Q.Li[a], L.Lv[a], R.Qiao[a], H.You[a], R.Chen[a], H.Sakurai[b], H.Otsu[b], Z.Li[b], M.Nishimura[b], S.Sakaguchi[b], H.Baba[b], Y.Togano[b], K.Yoneda[b], C.Li[b,c], S.Wang[b,a], H.Wang[b,a], K.Li[b,a], H.Xu[c], Z.Hu[c], J.Wang[c], L.Duan[c], X.Zhang[c], R.Chen[c], Z.Guo[c], Z.Sun[c], X.Lei[c], Z.Xu[c], T.Nakamura[d], Y.Nakayama[d], Y.Kondo[d], S.Deguchi[d], Y.Satou[e], K.H.Tshoo[e]

[a]School of Physics and State Key Laboratory of Nuclear Physics and Technology, Peking University, Beijing 100871, China

[b]RIKEN, 2-1Hirosawa, Wako, Saitama, 351-0198, Japan

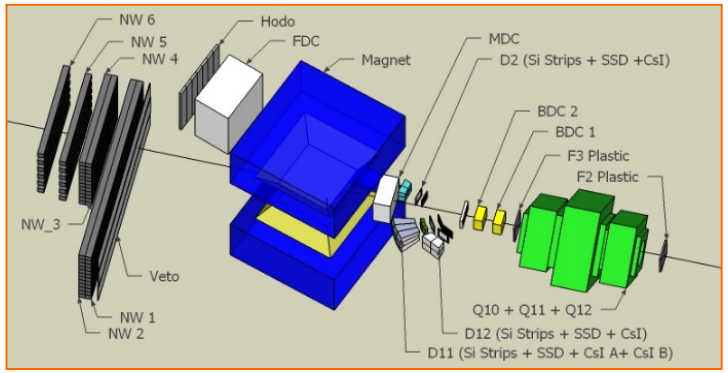
Knockout reaction induced by ^{6}He at 82.3 MeV/*u*

L H Lv[1], J Xiao[1], Y L Ye[1,5], Z X Cao[1], D X Jiang[1], T Zheng[1], H Hua[1], Z H Li[1], X Q Li[1], Y C Ge[1], J L Lou[1], R Qiao[1], Q T Li[1], H B You[1], R J Chen[1], H Sakurai[2], H Otsu[2], M Nishimura[2], S Sakaguchi[2], H Baba[2], Y Togano[2], K Yoneda[2], C Li[2], S Wang[2], H Wang[2], K A Li[2], T Nakamura[3], Y Nakayama[3], Y Kondo[3], S Deguchi[3], Y Satou[4] and K Tshoo[4]

[1] School of Physics and State Key Laboratory of Nuclear Physics and Technology, Peking University, Beijing 100871, People's Republic of China
[2] RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan

J. Phys. G: Nucl. Part. Phys. **39** (2012) 065102 (9pp)

Based on a knockout reaction experiment performed in RIKEN (2009), the ground state structure of $^{7-8}$He has been studied.



Physics Letters B 707 (2012) 46–51

Contents lists available at SciVerse ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

Recoil proton tagged knockout reaction for ^{8}He

Z.X. Cao [a], Y.L. Ye [a,*], J. Xiao [a], L.H. Lv [a], D.X. Jiang [a], T. Zheng [a], H. Hua [a], Z.H. Li [a], X.Q. Li [a], Y.C. Ge [a], J.L. Lou [a], R. Qiao [a], Q.T. Li [a], H.B. You [a], R.J. Chen [a], D.Y. Pang [a], H. Sakurai [b], H. Otsu [b], M. Nishimura [b], S. Sakaguchi [b], H. Baba [b], Y. Togano [b], K. Yoneda [b], C. Li [b], S. Wang [b], H. Wang [b], K.A. Li [b], T. Nakamura [c], Y. Nakayama [c], Y. Kondo [c], S. Deguchi [c], Y. Satou [d], K. Tshoo [d]

[a] School of Physics and State Key Laboratory of Nuclear Physics and Technology, Peking University, Beijing 100871, China
[b] RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan

- **Joint efforts to strengthen and promote in-depth exchanges and cooperation:**

- In 2006, the Council for China-Japan Research Collaboration on Nuclear Physics was established with its contact offices located at PKU and RIKEN.

- The Asian Nuclear Physics Association (ANPhA) was first launched by China, Japan, South Korea and Vietnam in 2009.

- **Nishina School :**

Recent News and Research Topics of RIBF

"Nishina School"

Seven outstanding undergraduate seniors of Peking University led by Prof. Y. Ye, Director of Physics Department, and Prof. T. Zhen, visited Nishina Center to join the first "Nishina School" held from Oct. 7 to 16. They enjoyed classes including lectures and laboratory training as part of the school. The photo was taken at the opening ceremony of the school held on Oct. 7.

JPSJ News and Comments on discovery of new isotopes ^{125,126}Pd

The first paper of the BigRIPS experiment on discovery of the new isotopes, ^{125,126}Pd, has been selected for "JPSJ News and Comments" written by Prof.Sakai, Univ. of Tokyo. The article is posted at http://jpsj.ipap.jp/news/jpsj-nc_37.htm.

Groundbreaking in-trap laser spectroscopy at SLOWRI prototype

The SLOWRI team has performed the first ever laser cooling and precision spectroscopy of ions produced by a fragment separator. Energetic radioactive Be ions from RIPS were stopped and thermalized in their gas catcher system, then laser cooled to μeV, a factor of 10^{-15}-fold energy reduction, which allowed measurements of the hfs of $^{7,11}Be^{+}$ as well as the $S_{1/2}$-$P_{1/2,3/2}$ transitions of $^{7,9,10,11}Be^{+}$ with high accuracies by double resonance spectroscopy.

"Covalent" states in ^{12}Be

Two theoretical papers by Makoto Ito and his colleagues; PRL 100(2008) 182502, PRC 78(2008) 011602(R), have been picked out and introduced by Physical Review Focus, http://focus.aps.org/story/v22/st4 . The team applied a microscopic cluster model to the $^{12}Be=\alpha+\alpha+4N$ system and showed that this nucleus can briefly resemble a covalently bounded molecule, an ionically bounded molecule, or a pair of neutral atoms. They also predicted characteristic enhancements in two neutron transfers to excite these molecules.

12 times

83 students

2008


2009

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2011

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2013

2014

2015

2016

2017

2018

2019

Some feedbacks from former participants

Kong Hoi-Io（江恺瑶）: We can do all the things together, and if I have some problems, other students can help me.

Li Zong-Hao（李宗浩）: The teachers are very smart and kind.

Ma Jing（马竞）: I have experienced different culture here, and the teachers are very nice.

Yin Zhe-Wei（殷喆伟）: I have the chance to do experiment on an accelerator for the first time, and we met all kinds of problems. It is very challenging and exciting.

高见（GAO, Jian）： I learned a lot from the impressive courses and exciting experiments.

江燕（JIANG, Yan）： I have got a new skill that I can identify a radioactive isotope through its X-ray and gamma spectroscopy.

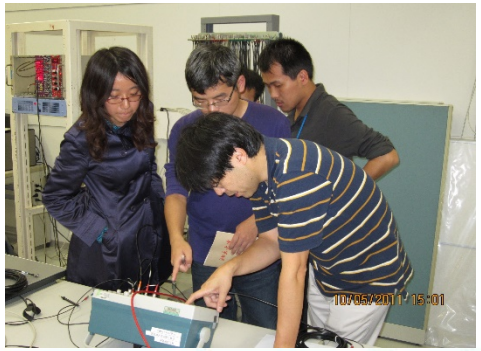
刘威（LIU, Wei）： The more you ask, the more you will learn.

徐智怡（XU, Zhiyi）： International Cooperation is the key to contemporary research success.

余翰舟（YU, Hanzhou）： We learned a lot in this visiting program, I express my sincere gratitude to all professors and researchers. Wish Nishina School a brighter future.

Wang Tiantian (王田田) : I feel happiness and friendship during these days. Science is not limited by countries.

Dai Sijie (戴思捷) : We have more buttons to adjust and wires to connect when doing experiments while our experiments are less interesting in Peking University.



马凯：Nishina School gave me a good opportunity to learn more about nuclear physics and it left me with a deep impression. I'd like to express my thanks to all the people who helped me.

林杰：I have gained a lot of expertise and familiarity with some methods of scientific research in Nishina School.

刘清元：I'm so glad that I can take part in Nishina School, and have an unforgettable experience there. The organizers had a thoughtful arrangement for us---diverse courses, a tour to the lab, and experiments, which help us get to know the whole part of the nuclear physics. Besides, accommodations made me feel like in a vacation. Above all, I make the acquaintance of so many nice teachers and excellent students. Wish to see all of you again!

刘方舟：Cooperation is the root of all team prosperity.

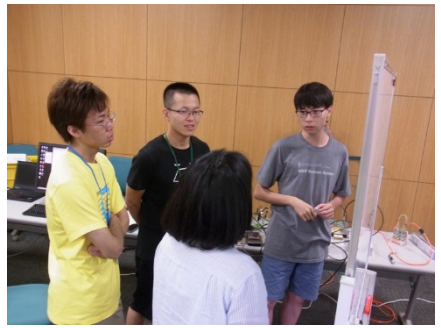
李思璇：The trip in Nishina school is really enjoyable， all the teachers we met impressed me deeply with their rich knowledge and great patience. Hope it can be better and better.

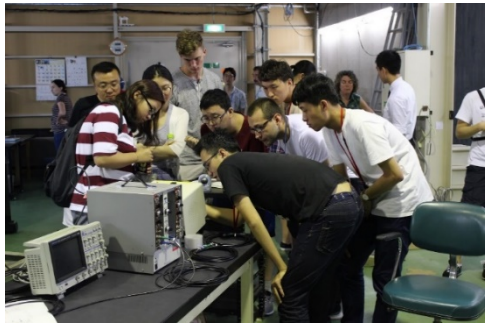
陈伊荻：This trip was both educational and enjoyable, the professors and mentors were really wise and responsible, and Tokyo is so beautiful:) Great thanks to all the people that helped us, I really learned a lot.

刘格良：Nishina school gives us a great chance to learn experimental skills, improve our teamwork ability, and to know and overcome our shortcomings.

王云祥：Thirteen days is very short, but academic performance of all members are really impressive. I learned a lot from this brilliant summer school program. Hope it can be better and better.

- Guo Lu (郭 璐)： Not only the knowledge we learned from the lectures, but also the training we got from the experiment made me know what we need to go further on the way of physics research. Thank you, RIKEN. Thank you, all our teachers!
- Jiao Longfei (焦 龙飞)：I have got lot of meaningful training from the experiment in Nishina School. It will benefit for my further study of nuclear physics.
- Peng Xingyu (彭 星宇)：it is a very meaningful and enjoyable experience for me.
- Tian Zhengyang (田 正阳)：The experience in Nishina School help me learn nuclear physics experiments and RIKEN's work. Also the culture of Japan. Thank you for the much care during the 12days.
- Xu Zijun(徐 子骏)： Little noise, perfect detectors, and enthusiastic teachers.
- Ya meilin (鸦 梅林)：I very like this experience of learning in Japan. The two weeks of life make me know something about the culture of Japan. I expect to come to Japan again.
- Zheng Pinghui (郑 平辉)：We learn much from all the nice teachers during the two weeks' stay in RIKEN, which is my first time to be abroad and it is a really helpful and unforgettable experience.
- Zhu xin (朱 鑫)：I did much more than that in China, it's a new experience.
- Yang Daneng (杨大能) :In the past two weeks, we shared happiness together, learnt together, and solved problems together … all these happened as if it was yesterday, I enjoyed my time at RIKEN!
- Li Jing (李晶) :The trip to RIKEN is a wonderful experience to me; I could feel the enthusiasm from Japanese people. And I learned a lot here.
- Li Fengyun (李峰云) :When you can do whatever you want to do, it's time to study efficiently!
- Xie Hao (谢浩) :Polite, modest, helpful, rigorous...the impressions of the nation across the sea had been far more than my expectations.
- Ge Lijian (葛理健) ： It is an unforgettable experience for me. The training I got in Nishina School will benefit for my further study.
- Yang Jinmin (阳金珉) :It's a wonderful journey in my life. Everyone here is friendly. Riken is really a perfect place to live and study.
- Wu Qiang (吴强) ： It's a pleasant journey, we learn a lot. We feel the hospitality and friendliness from the people, what's more, the rigorous attitude but relaxed style impresses me a lot.



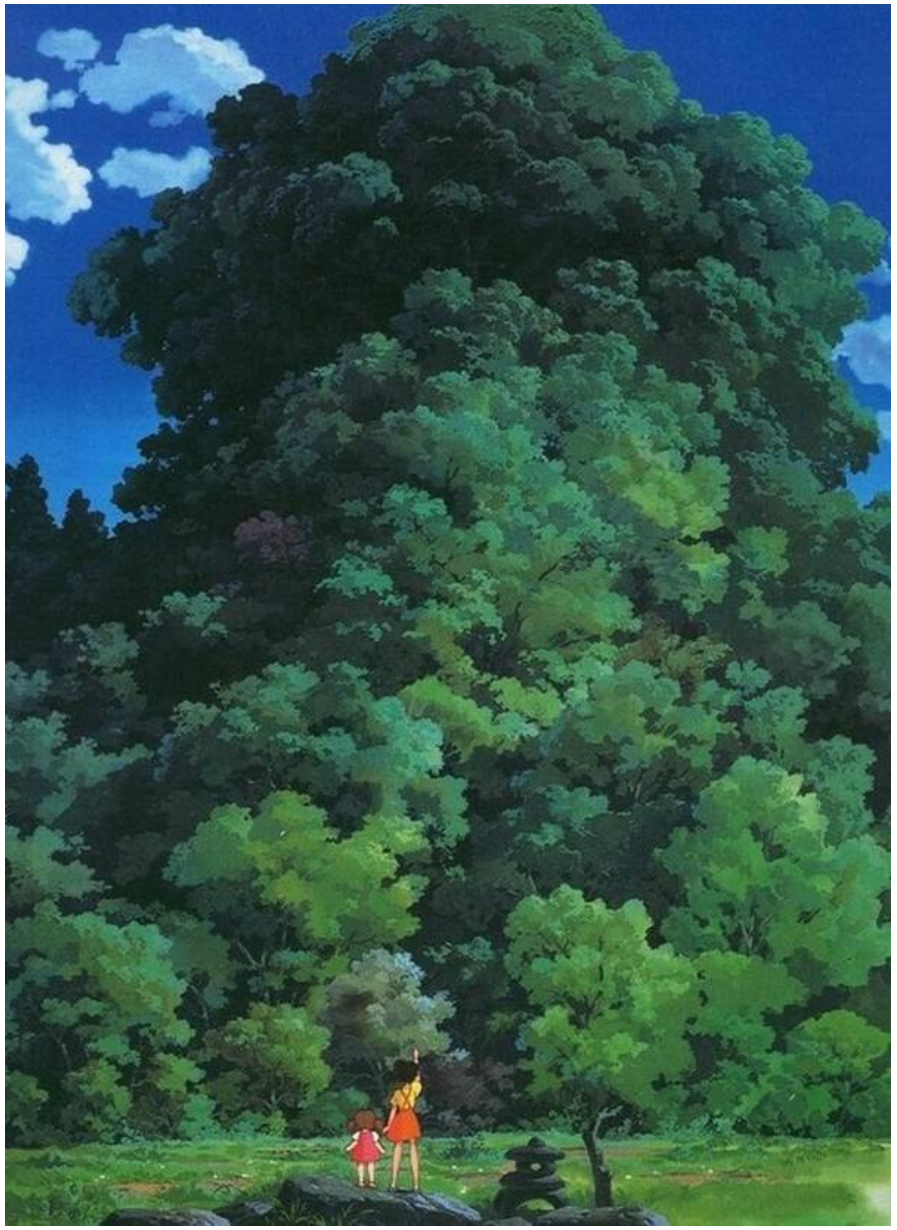


What do Nishina School offer?

- direct access to devices
- front-line scientific researchers at the forefront of nuclear physics research field
- the selfless teaching of teachers
- the practical experiments

What can we learn?

- professional knowledge
- Experimental skills
- rigorous attitude and innovative spirit



Thank you for your attention!