HOKKAIDO UNIVERSITY

JCPRG Progress Report

April 21, 2015

Shuichiro EBATA

Nuclear Reaction Data Centre (JCPRG)
Hokkaido University
JAPAN

Objectives of JCPRG

- **Compilation** of charged-particle and γ induced nuclear reaction data obtained in Japan
- **Evaluation** (theoretical calculation) of nuclear reaction data on light nuclei
- **Collaboration** promoted with Asian and International Nuclear Reaction Data Centres (NRDC)
- **Education** for graduate school students

JCPRG Member (FY2014: Apr. 2014 - Mar. 2015)

Group	Member
JCPRG Staff	Aikawa
JCPRG Researcher	Kato, Fujimoto, Furutachi
JCPRG Steering Committee	Aikawa, Hirabayashi, Kimura et al.
JCPRG Advisory Board	Aoi (RCNP), Fukahori (JAEA), Ohnishi (YITP), Otsuka (IAEA), Sakurai (RIKEN)
MML Researcher	Aiganym, Ebata, Ichinkhorloo, Imai, Zhou
Nuclear Theory Group	Kimura, Horiuchi, et al.
Hokkaido Nuclear Group	Chiba, Katayama, Masui, Noto, Okabe, et al.

JCPRG Member (FY2015: Apr. 2015 - Mar. 2016)

Group	Member
JCPRG Staff	Aikawa, ***Ebata***
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MML Researcher **⇒ Faculty of Science, HU**	Aiganym, Ebata, Ichinkhorloo, Imai, Zhou
Nuclear Theory Group	Kimura, Horiuchi, et al.
Hokkaido Nuclear Group	Chiba, Katayama, Masui, Noto, Okabe, et al.

Compilation Result (FY2014: Apr. 2014 - Mar. 2015)

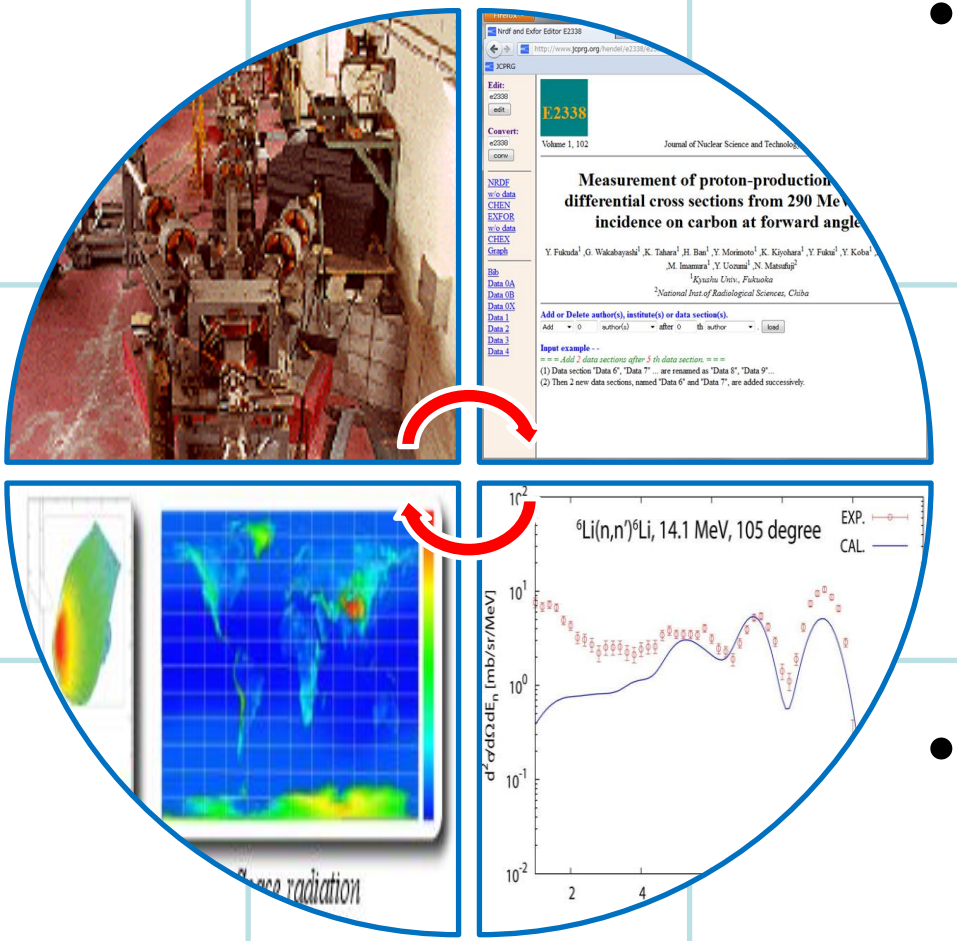
- Member
  - [EXFOR] **Ichinkhorloo**, Aikawa, Ebata, Furutachi
  - [NRDF] **Aikawa**, Chiba, Ebata, Katayama, Kato, Noto

- EXFOR
  - 22 new and 20 revised/deleted entries were transmitted as 8 trans files (E090-E096, R028) to the NDS open area.
- NRDF (Original database of JCPRG)
  - 22 new papers of charged-particle and γ induced reaction data were compiled for NRDF.

Four Topics and Keywords

- Experiment
  - @HU
  - @ATOMKI
  - @RIKEN

- Compilation
  - IAEA
  - NRDC
  - Asian Centres

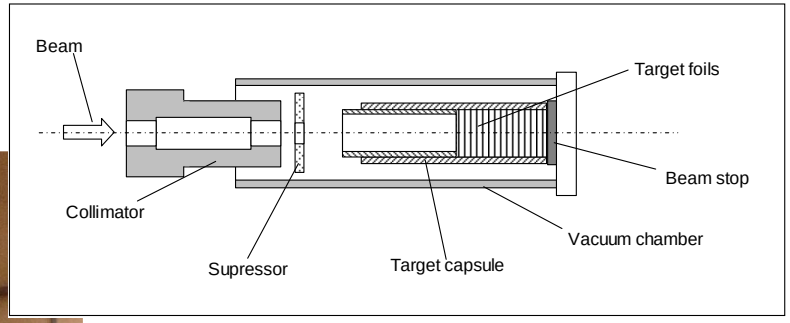


- Application
  - Medicine
  - Transmutation
  - Physics

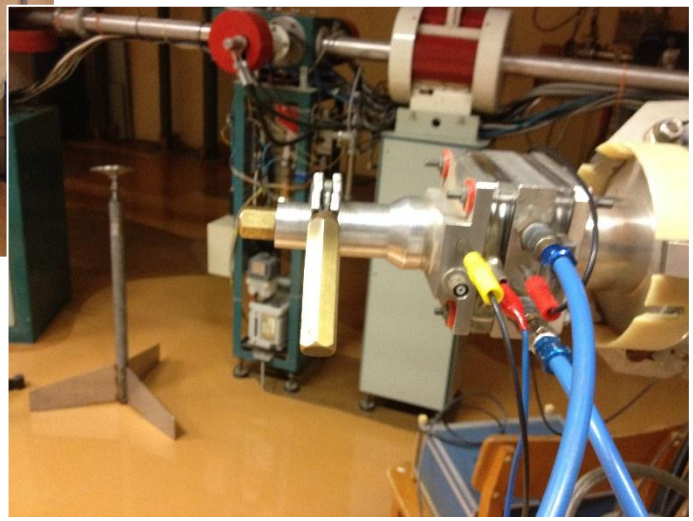
- Evaluation
  - CDCC
  - OCM+CSM
  - Cb-TDHFB

Experiment at ATOMKI (Apr. 2014)

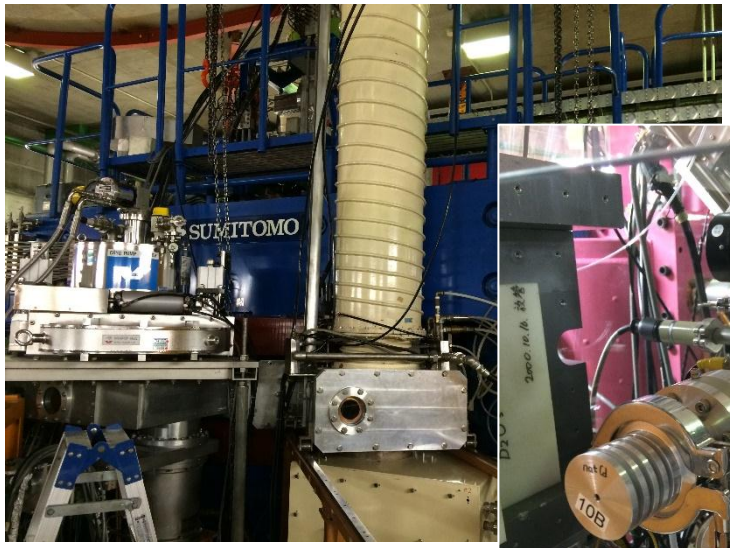
Cyclotron



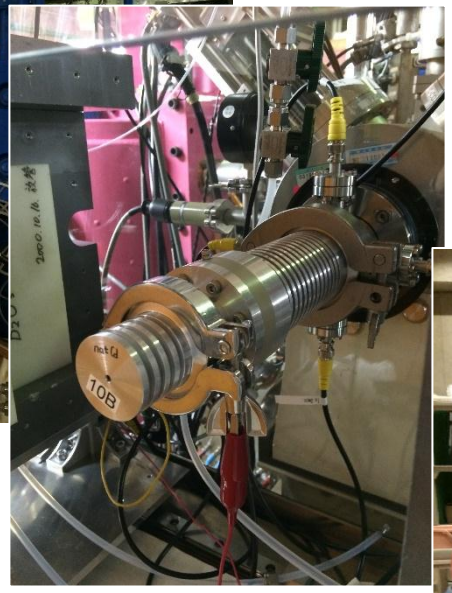
Target holder



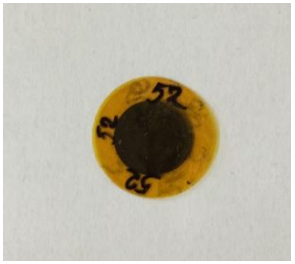
Experiment at RIKEN (Jan. 2015)



Cyclotron



Holder



Target

Evaluation (Theoretical calculation)

- Member
  - **Zhou**, Aikawa, Ebata, Ichinkhorloo, Kato, Kimura, Hirabayashi

- Method
  - CDCC
  - Cb-TDHFB

PHYSICAL REVIEW C **90**, 024303 (2014)

Systematic investigation of low-lying dipole modes using the canonical-basis time-dependent Hartree-Fock-Bogoliubov theory

Shuichiro Ebata,[1,2,3] Takashi Nakatsukasa,[3,4] and Tsunenori Inakura[3,5]
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[2]*Center for Nuclear Study, University of Tokyo, Wako-shi 351-0198, Japan*
[3]*RIKEN Nishina Center, Wako-shi 351-0198, Japan*
[4]*Center for Computational Sciences, University of Tsukuba, Tsukuba 305-8571, Japan*
[5]*Department of Physics, Graduate School of Science, Chiba University, Chiba, 263-8522, Japan*
(Received 28 March 2014; published 7 August 2014)

Systematic investigations of the electric dipole ($E1$) modes of excitation are performed using the canonical-basis time-dependent Hartree-Fock-Bogoliubov (Cb-TDHFB) theory. The Cb-TDHFB is able to describe dynamical pairing correlations in excited states of nuclear systems. We apply the method to the real-time calculation of linear response in even-even nuclei with Skyrme functionals. Effects of shell structure, neutron skin, deformation, and neutron chemical potential (separation energy) are studied in a systematic way. This reveals a number of characteristic features of the low-energy $E1$ modes. We also find a universal behavior in the low-energy $E1$ modes for heavy neutron-rich isotopes, which suggests the emergence of decoupled $E1$ peaks beyond $N = 82$.

DOI: 10.1103/PhysRevC.90.024303 PACS number(s): 21.10.Pc, 21.60.Jz, 24.30.Gd, 25.20.−x

Ebata et al., Phys. Rev. C **90**, 024303 (2014)

Software and Service

- Member
  - **Aiganym**, Aikawa, Ebata, Fujimoto, Imai, Chiba, Katayama, Noto
- Coding Software
  - Editor "HENDEL"
  - Digitizer "GSYS"
- Data Retrieval System
  - NRDF (http://www.jcprg.org/nrdf/)
  - NRDF/A (http://www.jcprg.org/nrdfa/)
  - EXFOR/ENDF (http://www.jcprg.org/exfor/)

International and Domestic collaboration

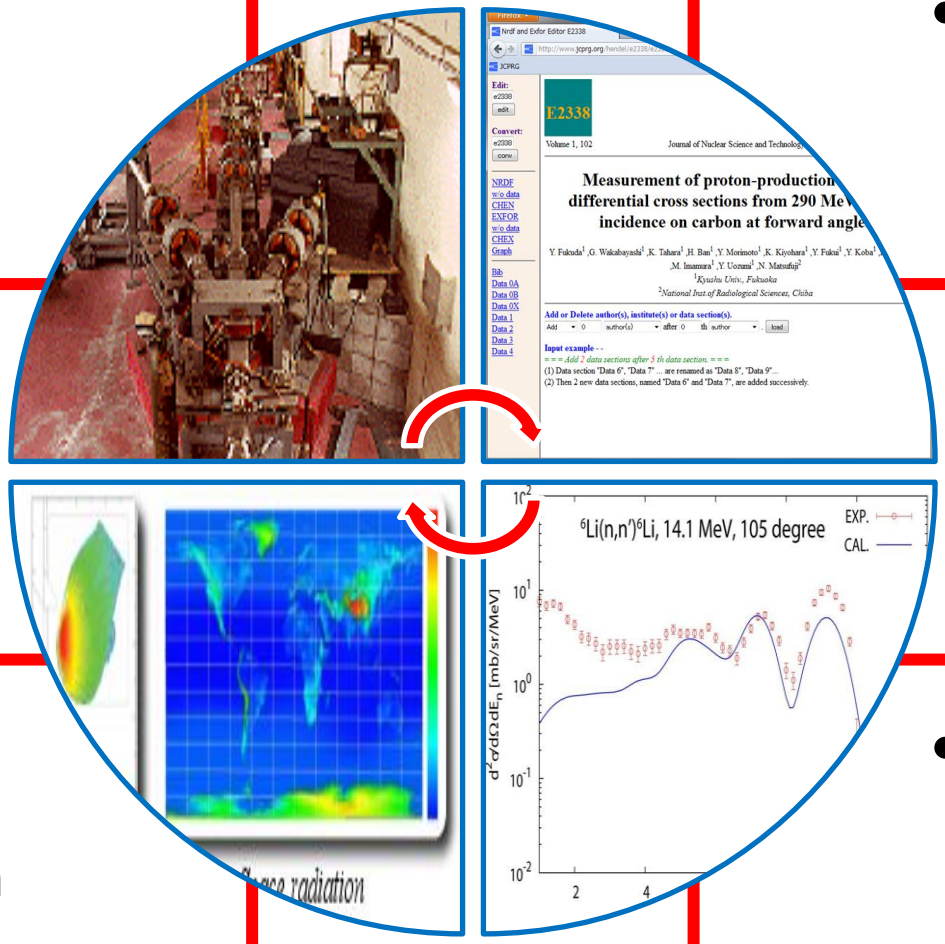
- IAEA and NRDC
- CA-NRDB: Nuclear Physics, Nuclear Technology
- RIKEN: Transmutation, Medicine
- JAEA: Transmutation, Medicine
- RCNP

- ATOMKI: Medicine
  - JSPS Bilateral Program was accepted and started from Apr. 2014.
  - Experiments was performed at ATOMKI and will be performed at RIKEN.
  - Theoretical calculation will be performed under the collaboration with JAEA.

Summary (Keywords in Topics)

- **Experiment**
  - @HU
  - @ATOMKI
  - @RIKEN

- **Compilation**
  - IAEA
  - NRDC
  - Asian Centres



- **Application**
  - Medicine
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  - Physics

- **Evaluation**
  - CDCC
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