SAMURAI International Collaboration Workshop 2019

Report of Contributions

https://indico2.riken.jp/e/2983

Contribution ID: **2** Type: **not specified**

Cluster structure of neutron-rich Beryllium isotopes investigated by cluster quasi-free scattering reaction

Saturday, August 31, 2019 4:10 PM (20 minutes)

Alpha clustering is the key cornerstone for the complete understanding of the structure of nuclei and fundamental nuclear interactions. So far alpha-particle clustering has dominated cluster states studies among all other possible partitioning. While it is known for long as an important feature of stable N=Z nuclei [1], its existence in exotic nuclei with large imbalance of proton and neutron number is still a question. Neutron-excess Beryllium isotopes 10Be,12Be,14Be are the very appealing candidates of clustering studies as being built on the well-developed alpha-alpha rotor of 8Be (N=4, Z=4). It is predicted by the recent antisymmetrized molecular dynamics model (AMD) that strong degree of alpha clustering in the ground-state remain high from 10Be up to the dripline 14Be [2].
The SAMURAI12 experiment performed at Radioactive Isotope Beam Factory (RIBF) in RIKEN aims to investigate the cluster structure of neutron-rich beryllium isotopes using the cluster quasifree scattering reaction (p,pa) in inverse kinematics. The reactions of interest were induced by beams of 10,12,14Be isotopes at 150MeV/u impinging on a pure large diameter 2 mm thick solid hydrogen target. The detection of Helium residues was performed by using the SAMURAI spectrometer and its standard detectors. ESPRI Recoil Proton Spectrometer (RPS) was implemented for recoil proton detection, covering an angular range of 50°-70°. For detection of alpha clusters, two telescopes composed of Silicon and CsI(Tl) detectors was placed at forward angles to cover the angular range 4°-12°. Their cross sections and momentum distributions allow us to probe the alpha cluster structures directly and quantitatively. In this talk, the status of data analysis will be presented.

Primary authors: LI, Pengjie (HKU); BEAUMEL, Didier (IPN Orsay / RIKEN Nishina center); LEE, Jenny (The University of Hong Kong)

Presenter: LI, Pengjie (HKU)

Session Classification: Status report

Contribution ID: **3** Type: **not specified**

Invariant-Mass Spectroscopy at the low-Z Shore of the Island of Inversion

Friday, August 30, 2019 1:30 PM (20 minutes)

The so-called "island of inversion"is a region in the nuclear landscape where shell-structure changes are observed and in particular the magic neutron number at N=20 vanishes. For those nuclei at Z=10–12 and around N=20, the shell gap at N=20 quenches and pf-shell intruder configurations become important. We address the question how strong such configurations are for very neutron-rich but Z=9 fluorine isotopes. Such exotic nuclei are produced at the radioactive-ion beam factory (Japan) at beam energies around 250 MeV/u. 29F$_*$ & 30F are studied in inverse kinematics at the SAMURAI experimental setup by (p,2p) reactions on neon isotopes. The two and one neutron-unbound states, respectively, are investigated in terms of invariant-mass spectroscopy where the decay neutrons are measured explicitly. The resulting excitation-energy spectra are compared to different shell-model based calculations. Moreover, 29F$_*$ shows a strong two-neutron sequential decay that is also analyzed by means of Jacobi coordinates.

This work is supported by the DFG through grant no. SFB 1245, the BMBF under contract no. 05P15RDFN1, and the GSI-TU Darmstadt cooperation agreement.

Primary authors: Dr ROSSI, Dominic (TU Darmstadt); KAHLBOW, Julian (TU Darmstadt)

Co-authors: SCHEIT, Heiko (TU Darmstadt); AUMANN, Thomas (Technische Universitaet Darmstadt); KONDO, Yosuke (Tokyo Institute of Technology)

Presenter: Dr ROSSI, Dominic (TU Darmstadt)

Session Classification: Status report

Contribution ID: **4** Type: **not specified**

Study of unbound nuclei ^{33}Ne via one-proton knockout reactions

Friday, August 30, 2019 1:50 PM (20 minutes)

The magicity of N=20 in the vicinity of Ne, Na, and Mg isotopes vanishes due to pf-shell intruder configuration, which is called 'island of inversion' [1-3]. In recent years, shell evolution of Ne isotopes in this region is emerging topic of interest [4,5]. Nevertheless, there is no observed state of ^{33}Ne.
It is only known that ^{33}Ne is unbound nuclei [6] and the *1n* separation energy S_n is only predicted to -0.9 MeV [7].
The experiment was carried out at the RIBF in RIKEN. The secondary beam of ^{34}Na at 264 MeV/nucleon was provided by BigRIPS [8] and impinged on the carbon reaction target. After the one-proton knockout reaction of ^{34}Na, ^{33}Ne was produced and immediately decayed into ^{32}Ne and a neutron. The invariant mass spectrum of ^{32}Ne + n system was reconstructed by measurement of fragments and neutrons using SAMURAI spectrometer [9]. In this presentation, details of analysis and preliminary results of ^{32}Ne + n invariant mass spectrum will be discussed.

[1] Z. Elekes *et al.*, Phys. Rev. C **73**, 044314 (2006).
[2] P. Doornenbal *et al.*, Phys. Rev. Lett. **103**, 032501 (2009).
[3] P. Doornenbal *et al.*, Phys. Rev. C **81**, 041305 (2010).
[4] T. Nakamura *et al.*, Phys. Rev. Lett. **112**, 142501 (2014).
[5] I. Murray *et al.*, Phys. Rev. C **99**, 011302 (2019).
[6] M. Notani *et al.*, Phys. Lett. B **542**, 49 (2002).
[7] G. Audi, H. Wapstra, and C. Thibault, Nucl. Phys. A **729**, 337 (2003).
[8] T. Kubo, Nucl. Inst. and Meth. B **204**, 97 (2003).
[9] T. Kobayashi *et al.*, Nucl. Inst. and Meth. B **317**, 294 (2013).

Primary author: Mr CHAE, Hyunwoo (Seoul National University)

Presenter: Mr CHAE, Hyunwoo (Seoul National University)

Session Classification: Status report

Contribution ID: **5** Type: **not specified**

Analysis update on the low-energy dipole response of the halo nuclei ^{6,8}He

Saturday, August 31, 2019 4:50 PM (20 minutes)

In July 2017, the SAMURAI37 experiment was performed with the purpose of measuring the multi-neutron decay of ^{6}He and ^{8}He after heavy-ion-induced electromagnetic excitation in complete kinematics to study the dipole response of these nuclei.
The combination of the neutron detectors NEBULA and NeuLAND at the SAMURAI setup and the high beam intensities available at RIBF made the measurement of the dipole response of ^{8}He possible for the first time. The experimental method is based on the measurement of the differential cross section via the invariant-mass method, which allows to extract the dipole strength distribution dB(E1)/dE and the photo-absorption cross section. To induce electromagnetic excitation reactions of ^{6}He and ^{8}He a lead target was used.
In the talk the status of the ongoing analysis is presented.

Primary authors: LEHR, Christopher (TU Darmstadt); AUMANN, Thomas (Technische Universitaet Darmstadt)

Presenter: LEHR, Christopher (TU Darmstadt)

Session Classification: Status report

Contribution ID: **6** Type: **not specified**

Analysis Update on the Lifetime Measurement of the ^{26}O g.s. at SAMURAI

Friday, August 30, 2019 2:10 PM (20 minutes)

A recent experiment suggests that the ground state of the neutron-unbound nucleus ^{26}O could have a lifetime in the pico-second regime. This would constitute the first case of a radioactive decay via neutron emission, if this value can be confirmed.

In Dezember 2016, the S20 experiment using a new measurement method to determine the decay lifetime
of the ^{26}O ground state with high sensitivity and precision was performed at SAMURAI. Here, a ^{27}F beam was produced in the fragment separator BigRIPS and impinged on a W/Pt target stack where ^{26}O was produced. According to the lifetime, the decay of ^{26}O happens either in- or outside the target. Thus, the velocity difference between the decay neutrons and the fragment ^{24}O delivers a characteristic spectrum from which the lifetime can be extracted.

The current analysis status will be reported.

Primary author: Ms STORCK, Sonja (TU Darmstadt)

Presenter: Ms STORCK, Sonja (TU Darmstadt)

Session Classification: Status report

Contribution ID: **7** Type: **not specified**

Study of unbound excited states in ^{17}C

Saturday, August 31, 2019 1:40 PM (20 minutes)

A study of unbound excited states in ^{17}C through one-neutron knockout of ^{18}C at the energy of 245 MeV/nucleon on a carbon target was performed using the SAMURAI spectrometer. Relative energy spectrum of unbound ^{17}C was reconstructed from momentum vectors of ^{16}C fragments and neutrons. The relative energy spectrum was characterized by six resonances at $E_{\rm rel}$ = 0.54, 0.81, 1.41, 1.92, 2.30, and 3.22 MeV. Three of them at $E_{\rm rel}$ = 0.54, 1.41, and 2.30 MeV were identified to be in coincidence with ^{16}C(2^+_1), while others have no coincidence with that.
Orbital angular momenta of two resonances at $E_{\rm rel}$ = 1.92 and 3.22 MeV were determined as 1 by momentum distributions. The resonance at $E_{\rm rel}$ = 0.81 MeV, assigned as $5/2^+_2$, was newly observed in the present work. With regard to the resonances having the coincidence with ^{16}C(2^+_1), decay properties of candidate states were examined by branching ratio and shell-model calculations, and spin-parities of them were tentatively assigned. From the present study, it turned out that the YSOX shell-model interaction, involving tensor force for p-sd cross-shell part, provides a good account of the observation. In the presentation, the results and detailed interpretation will be shown.

Primary author: Dr KIM, Sunji

Presenter: Dr KIM, Sunji

Session Classification: Status report

Contribution ID: **8** Type: **not specified**

Search for preformed-alpha particles via alpha-knockout reaction from alpha-decay nuclei

we would like to propose an experiment to observe the preformed α particles using the quasi-free α-knockout reaction from α-decay nuclei.

Primary author: Dr TANAKA, Junki (Riken, Nishina Center)

Presenter: Dr TANAKA, Junki (Riken, Nishina Center)

Session Classification: New proposal

Contribution ID: **9** Type: **not specified**

Analysis of 8He(p, p alpha)4n

Friday, August 30, 2019 3:50 PM (20 minutes)

Details will be given on the current status of the analysis of the 8He(p, p alpha)4n experiment.

Primary author: Dr DUER, Meytal (TU Darmstadt)

Presenter: Dr DUER, Meytal (TU Darmstadt)

Session Classification: Status report

Contribution ID: **10** Type: **not specified**

Study on tensor correlation in neutron-rich nuclei via (p,pd) reaction

Tensor interaction and associated correlation play primary roles in understanding the nuclear structure and thus attracts much attentions in both experimental and theoretical studies in modern nuclear physics. Recently, (p,pd) reaction at high energy is found to be a powerful tool to study tensor correlation in proton-neutron pairs [1]. In the present study, we would like to investigate the tensor correlation in neutron-rich system by using the (p,pd) reaction at high energy with the beams of 10,12Be. In the presentation, the physics motivation and experimental feasibility will be discussed.

[1] S. Terashima et al., Phys. Rev. Lett. 121, 242501 (2018).

Primary authors: WANG, He (Tokyo Institute of Technology); NAKAMURA, Takashi (Tokyo Institute of Technology); KONDO, Yosuke (Tokyo Institute of Technology); OTSU, Hideaki (RIKEN Nishina Center)

Presenter: WANG, He (Tokyo Institute of Technology)

Session Classification: New proposal

Contribution ID: **11** Type: **not specified**

Status report of the SAMURAI21 experiment

I will report the status of the SAMURAI21 experiment that is dedicated for the observation of the unbound nuclei 27O and 28O. In the presentation, I also want to discuss a possible new measurement for 27O as described in the pre-proposal.

Primary author: KONDO, Yosuke (Tokyo Institute of Technology)

Presenter: KONDO, Yosuke (Tokyo Institute of Technology)

Session Classification: New proposal

Contribution ID: **12** Type: **not specified**

Status report of dipole strength measurement performed in S09 and ImPACT

Saturday, August 31, 2019 4:30 PM (20 minutes)

I will give a status report on the analysis of the SAMURAI09 experiment.

Primary author: TOGANO, Yasuhiro (Rikkyo University)

Presenter: TOGANO, Yasuhiro (Rikkyo University)

Session Classification: Status report

Contribution ID: **13** Type: **not specified**

Status of NEBULA-Plus and Possible Future Experiments

In this presentation we will briefly update the collaboration on the status of the NEBULA- Plus upgrade of the NEBULA array –the instrumentation aspect of the French ANR funded project "EXPAND". Possible future experiments using the upgraded array will be discussed, including those that may be proposed at the RIBF Dec 2019 NPAC.

Primary author: ORR, Nigel (LPC-Caen)

Presenter: ORR, Nigel (LPC-Caen)

Session Classification: New proposal

Contribution ID: **14** Type: **not specified**

Opening remark

Primary author: NAKAMURA, Takashi (Tokyo Institute of Technology)

Presenter: NAKAMURA, Takashi (Tokyo Institute of Technology)

Contribution ID: **15** Type: **not specified**

Opening remark

Friday, August 30, 2019 10:00 AM (5 minutes)

Primary author: NAKAMURA, Takashi (Tokyo Institute of Technology)

Presenter: NAKAMURA, Takashi (Tokyo Institute of Technology)

Session Classification: Remark

Contribution ID: **16** Type: **not specified**

Development of high-granularity neutron detector array HIME

Friday, August 30, 2019 10:25 AM (20 minutes)

Primary author: NAKAMURA, Takashi (Tokyo Institute of Technology)

Presenter: NAKAMURA, Takashi (Tokyo Institute of Technology)

Session Classification: Status report

Contribution ID: **17** Type: **not specified**

STRASSE: a silicon tracker project for quasi free scattering at RIBF

Friday, August 30, 2019 10:05 AM (20 minutes)

Primary author: SUN, Yelei (CEA Saclay)

Presenter: SUN, Yelei (CEA Saclay)

Session Classification: Status report

Contribution ID: **18** Type: **not specified**

Status of TUDa funding application for construction of HIME and future experiments at SAMURAI

Friday, August 30, 2019 10:45 AM (20 minutes)

Primary author: AUMANN, Thomas (Technische Universitaet Darmstadt)

Presenter: AUMANN, Thomas (Technische Universitaet Darmstadt)

Session Classification: Status report

Contribution ID: **19** Type: **not specified**

TBA

Friday, August 30, 2019 11:25 AM (30 minutes)

Primary author: ORR, Nigel (LPC-Caen)

Presenter: ORR, Nigel (LPC-Caen)

Session Classification: New proposal

Contribution ID: **20** Type: **not specified**

TBA

Friday, August 30, 2019 11:55 AM (30 minutes)

Primary author: WANG, He (RIKEN Nishina Center)

Presenter: WANG, He (RIKEN Nishina Center)

Session Classification: New proposal

Contribution ID: **21** Type: **not specified**

Measurement of isotopic production cross sections of the proton- and deuteron-induced spallation reactions on 93Zr at 209 MeV/u

Friday, August 30, 2019 2:30 PM (20 minutes)

Primary author: Dr KAWASE, Shoichiro (Kyusyu University)

Presenter: Dr KAWASE, Shoichiro (Kyusyu University)

Session Classification: Status report

Contribution ID: **22** Type: **not specified**

TBA (Fission)

Friday, August 30, 2019 2:50 PM (20 minutes)

Primary author: SASANO, Masaki (RIKEN Nishina Center)

Presenter: SASANO, Masaki (RIKEN Nishina Center)

Session Classification: Status report

Contribution ID: **23** Type: **not specified**

TBA (RIKEN status)

Friday, August 30, 2019 3:30 PM (20 minutes)

Primary author: YONEDA, Ken-ichiro (RIKEN Nishina Center)

Presenter: YONEDA, Ken-ichiro (RIKEN Nishina Center)

Session Classification: Status report

Contribution ID: **24** Type: **not specified**

quasi-free (p,pn) reaction with Borromean nuclei 11Li,14Be, and 17B

Friday, August 30, 2019 4:10 PM (20 minutes)

Primary author: YANG, Zaihong (RIKEN)

Presenter: YANG, Zaihong (RIKEN)

Session Classification: Status report

Contribution ID: **25** Type: **not specified**

Status report of S24 experiment: Investigation of unbound states in neutron-deficient 66Se

Friday, August 30, 2019 4:30 PM (20 minutes)

Primary author: PANIN, Valerii (RIKEN, Spin-isospin laboratory)

Presenter: PANIN, Valerii (RIKEN, Spin-isospin laboratory)

Session Classification: Status report

Contribution ID: **26** Type: **not specified**

Nuclear breakup and Coulomb dissociation of 9C nucleus studied at RIBF RIKEN

Saturday, August 31, 2019 2:40 PM (20 minutes)

Primary author: MOTOBAYASHI, Tohru (RIKEN Nishina Center)

Presenter: MOTOBAYASHI, Tohru (RIKEN Nishina Center)

Session Classification: Status report

Contribution ID: **27** Type: **not specified**

HI-α invariant mass spectroscopy

Friday, August 30, 2019 4:50 PM (20 minutes)

Primary author: OTSU, Hideaki (RIKEN Nishina Center)

Presenter: OTSU, Hideaki (RIKEN Nishina Center)

Session Classification: Status report

Contribution ID: **28** Type: **not specified**

TBA (RIBFDAQ)

Saturday, August 31, 2019 9:30 AM (30 minutes)

Primary author: BABA, Hidetada (RIKEN)

Presenter: BABA, Hidetada (RIKEN)

Session Classification: Status report

Contribution ID: **29** Type: **not specified**

TBA (SAMURAI DAQ)

Saturday, August 31, 2019 10:00 AM (30 minutes)

Primary author: SASANO, Masaki (RIKEN Nishina Center)

Presenter: SASANO, Masaki (RIKEN Nishina Center)

Session Classification: Status report

Contribution ID: **30** Type: **not specified**

TBA

Saturday, August 31, 2019 10:50 AM (30 minutes)

Primary author: KONDO, Yosuke (Tokyo Institute of Technology)

Presenter: KONDO, Yosuke (Tokyo Institute of Technology)

Session Classification: New proposal

Contribution ID: **31** Type: **not specified**

TBA

Saturday, August 31, 2019 11:20 AM (30 minutes)

Primary author: Dr TANAKA, Junki (Riken, Nishina Center)

Presenter: Dr TANAKA, Junki (Riken, Nishina Center)

Session Classification: New proposal

Contribution ID: **32** Type: **not specified**

TBA (SEASTAR)

Saturday, August 31, 2019 1:20 PM (20 minutes)

Primary author: DOORNENBAL, Pieter (RIKEN)

Presenter: DOORNENBAL, Pieter (RIKEN)

Session Classification: Status report

Contribution ID: **33** Type: **not specified**

TBA (S40+HIME)

HIME

Primary author: NAKAMURA, Takashi (Tokyo Institute of Technology)

Presenter: NAKAMURA, Takashi (Tokyo Institute of Technology)

Session Classification: Status report

Contribution ID: **34** Type: **not specified**

Study of Gamow-Teller transition in neutron-rich 11Li

Saturday, August 31, 2019 2:00 PM (20 minutes)

Primary author: Dr HIRAI, Yuma (Kyusyu University)

Presenter: Dr HIRAI, Yuma (Kyusyu University)

Session Classification: Status report

Contribution ID: **35** Type: **not specified**

Analysis status of S31: Probing isospin dependence of nucleon correlations using (p,pN) reaction

Saturday, August 31, 2019 2:20 PM (20 minutes)

Primary author: POHL, Thomas (TU Darmstadt)

Presenter: POHL, Thomas (TU Darmstadt)

Session Classification: Status report

Contribution ID: **36** Type: **not specified**

Experimental study of density dependent symmetry energy at RIBF-SPiRIT

Saturday, August 31, 2019 3:30 PM (20 minutes)

Primary author: ISOBE, Tadaaki (RIKEN)

Presenter: ISOBE, Tadaaki (RIKEN)

Session Classification: Status report

Contribution ID: **37** Type: **not specified**

Status report of s034: study of 7H and the tetraneutron using 8He(p,2p) reaction

Saturday, August 31, 2019 3:50 PM (20 minutes)

Primary author: YANG, Zaihong (RIKEN)

Presenter: YANG, Zaihong (RIKEN)

Session Classification: Status report

Contribution ID: **38** Type: **not specified**

Closing remarks

Saturday, August 31, 2019 5:10 PM (10 minutes)

Primary author: NAKAMURA, Takashi (Tokyo Institute of Technology)

Presenter: NAKAMURA, Takashi (Tokyo Institute of Technology)

Session Classification: Remark