RIKEN NISHINA CENTER

R·I·B·F QUARTERLY

volume · 003
October 2008

Dear RIBF users

We are sending the 3rd issues of the RIBF Quarterly with the most up to the minutes information on our RI Beam Factory. The RIBF Quarterly and its past issues are available at our web site : http://www.nishina.riken.jp/UsersGuide/

Present status, operation schedules of RIBF

Oil contamination problem in the helium cooling system

After discovery of the serious oil contamination problem reported in the last RIBF Quarterly, construction work for repair, reform, and reinforcement of the helium cooling system of SRC, BigRIPS was successfully completed at the end of August as scheduled. After the final test of the entire system at the beginning of September, we started to cool down the magnets from mid-September. For the next three weeks, the coils of the magnets were in the liquied helium temparature, and all the magnets were successfully excited. SRC and BigRIPS are now finally ready for operation after nearly a-half-year shutdown. We have already started the acceleration of the U-beam from the last week of October.

A GARIS experiment to strengthen the evidence of Z=113 element

RIKEN Nishina Center decided to prioritize the following superheavy related experiment which was not previously scheduled; ^{23}Na + ^{248}Cm to produce ^{266}Bh via a hot fusion 5n evaporation channel. ^{266}Bh is an element that appeared in the decay chains of the ^{278}113 events which have been observed at RIKEN. Based on the recent observations of the "average equilibrium charge state" in GARIS of production residues in the reactions of ^{18}O+^{248}Cm and ^{22}Ne+^{248}Cm, we firmly confirmed that the magnetic rigidity of GARIS is sufficient to collect ^{266}Bh, which was thought to be difficult. In order to much strengthen the evidence of the Z=113 events, RIKEN Nishina Center decided to give top priority to this experiment, and re-arranged the beam-time schedule in the latter part of this fiscal year. A long term experiment will start from late December.

A series of BigRIPS experiments

After a successful recovery of the helium cryogenic plants from the oil problem, a series of BigRIPS experiments using the U and ^{48}Ca primary beams will be conducted from November for nearly two months. The ZeroDegree commissioning and an experiment will be carried out using the U beam whose intensity is expected to be nearly one order higher than that of the last experiment done in 2007. A couple of experiments using ^{48}Ca will follow in December. According to the results of the beam development, intense ^{48}Ca beam, more than 100 pnA, will be stably delivered for these experiments.

Experiments using AVF (alone) and RIPS

Experiments using AVF in stand-alone operation, including CRIB experiments, have been conducted steadily since October, since they are independent of the schedule of the BigRIPS experiments and the superheavy experiment. Some of RIPS experiments orginally scheduled for December and January, however, were postponed due to the re-arrangment of the beam time schedule.

Development activitiy : Toward intense U-beam

The unit of the coil assembly of a 28 GHz superconducting ECR ion source (prototype) was tested, and was successfully excited to the designed value at the beginning of October. The whole assembly of the ion source is now being carried out for installation in December. The operation of the ion source with a consisting 18-GHz power source is scheduled to start in the beginning of the next fiscal year, and much intense U-beam, an order of approximately 10, is expected during the next fiscal year. In the next fiscal year, a 28-GHz power source will be installed for further increase of the beam intensity.

Announcement

PAC meetings

The 4th Nuclear-Physics PAC meeting will be held on Nov. 20 and 21. Twelve proposals submitted will be reviewed at the meeting. The meeting program is available at http://www.nishina.riken.jp/UsersGuide/NP-PAC

The 4th Material and Life Science PAC meeting will be held from Jan. 13 to 14. Proposals for Material and Life Science experiments using heavy-ion beam at RIBF will be called for. Details will be announced soon.

Nishina Center
http://www.nishina.riken.jp/

PAC related
http://www.nishina.riken.jp/UsersGuide/

RIBF User Group
http://ribfwww.riken.go.jp/exp/RIBF_uec_eng/

Beam Time Schedule
http://www.nishina.riken.jp/rarfmt/pc.html

Seminar information
http://rarfaxp.riken.jp/~seminar

Toshimi Suda
User Support and Liaison Office
UserSupportOffice@ribf.riken.jp

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User Group Activities

The election of new UEC members

Election of the RIBF Users Exective Committee (UEC) members was held from Aug. 7 to 19, 2008. Thee of nine members were newly elected. They are K. Matsuta (Osaka U.), H. Scheit (RIKEN), and K. Yabana (U. Tsukuba). Their term of office is three years. The chair, and vice chair of the RIBF UEC are T. Suzuki (Saitama U.) and T. Uesaka (CNS). For further details, visit the web site of the users group; http://ribfwww.riken.go.jp/exp/RIBF_uec_eng .

The International User Group Meeting

The 2nd International RIBF Users Group meeting will be held on Nov. 22 (Sat.), immediately following the 4th NP-PAC meeting in Nov. 20-21. This meeting is hosted by the RIBF UEC. The tentative program is now available at

http://ribfwww.riken.go.jp/exp/RIBF_uec_eng/UserMeeting08/program.pdf.

Your participation is very welcome.

Lecture Series on Nuclear Physics

The 7th course of the Lecture Series on Nuclear Physics will be given by Prof. K. Langanke (GSI) on "Nuclear Astroplysics". The lecture will be held on Nov. 17 and 18 at the Nishina Hall.

Another lecture is now being planed on Dec. 24, 2008. The lecturer is Prof. I. Hamamoto (Lund), and the lecture will be on "One-particle motion in nuclear many-body problem", which is the third one in her lecture series.

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=α+α+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.

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