

## Dear RIBF users

This is the 5th issue of the RIBF Quarterly with the most up to the minute information on our RI Beam Factory. The back numbers are available at our web site:  
<http://www.nishina.riken.jp/UsersGuide/>

## Present status, operation schedules of RIBF

### Beam Time schedule

The beam time schedule of the first half of this fiscal year, April to Sept., are available at <http://www.nishina.riken.jp/rarfmt/pc.html>.

*The beam time requests are called twice a year, usually in July and in January, to all the spokespersons having valid PAC approved experiments. Based on their requests, the beam time schedule is fixed for every half year, which starts from April and October.*

### A new RIBF acceleration scheme and SHARAQ commissioning

In the middle of last March, a new acceleration scheme was tested, namely AVF - RRC - SRC skipping IRC. The 250-MeV/u <sup>14</sup>N beam was successfully accelerated, and delivered to a newly constructed SHARAQ for its commissioning.

### Recent Developments

#### 1. Towards intense heavy ion primary beams

The superconducting ECR ion source has been installed and is now being tested on site. It is expected that a few pA U beam will be available for BigRIPS experiments this fiscal year, which is about one order higher than that of the last year. A new beam line connecting to the RILAC is also under construction. The operation of this new system will soon start.

#### 2. Charge stripper development

Last February, intensive efforts were made to charge-stripper developments in collaboration with MSU. A gas-stripper system using nitrogen gas was tested for Xe and U beams. The Xe and U beams were accelerated up to RRC, and the charge-state distributions were measured after the stripper. It was found to work perfectly for Xe beam; the charge state optimum for following acceleration was obtained, promising acceleration of an intense Xe beam with good stability. One can expect a few 10 pA Xe beam. The intensity and beam quality will be confirmed by accelerating Xe beam upto SRC in this coming June. For U beam, however, it was not the case; the obtained charge state was unfortunately much lower than expected. For U beam, we will continue to develop a charge stripper system.

#### 3. BigRIPS

This summer, to facilitate maintenance under high residual radiation, the remotely releasable mechanism, "pillow seal", will be installed at the RI-beam production parts of the BigRIPS, specifically those for both the production-target and beam-dump areas. By this installation, BigRIPS will be able to accept full-intensity primary beams. Simultaneously, a construction of additional shielding in these areas will be conducted to reduce heat loads and radiation damages of the air-core quadrupole magnet placed downstream of the target chamber.

#### 4. other constructions

Construction of a new gas-filled recoil separator, GARIS-II, dedicated to chemical- and spectroscopic-studies of SHEs produced by 'hot fusion' reactions, has been completed. Its commissioning will start this summer.

As announced in the last RIBF Quarterly 4, the FY2008 supplemental budget from the government was approved for constructions of a new injector linac, RILAC II, and an electron storage ring, SR2. Both constructions have started. The RILAC II will be completed in the next March, and 300-MeV electron beam for eRI scattering will start to circulate in the year 2009.

### Operation plan of this fiscal year

#### 1. BigRIPS experiments

April - May : commissioning and tests

(AVF-RRC-SRC mode)

June : primary beam development (U, Xe, Zn)

Oct. - Dec. : BigRIPS experiments with high intensity primary beams  
AVF-RRC-SRC, RILAC-RRC-(fRC)-IRC-SRC modes

#### 2. Other experiments

Due to the construction and installation of the new injector heavy-ion linac, RILAC II, in the AVF hall, AVF will not be available in the period from Jan - March, 2010. In the period from Feb. to March, no RIPS experiment will be allocated since the RIPS hall, E6, will be also affected by the construction.

## Announcement

### Nishina Center Advisory Council

The activities of Nishina Center were reviewed by the Nishina Center Advisory Council (NCAC) held in Jan. 15-17, 2009. The NCAC report submitted to the president of RIKEN, Prof. R. Noyori, is now available on the RIKEN web site at <http://www.riken.jp/r-world/info/report/nishina/nac/2009/report09.pdf>

### PAC

The 5th Nuclear Physics PAC meeting will be held in June 18 and 19. We are now calling for proposals, and the submission deadline is May 15. For further details, refer to "call for proposals" available at <http://www.nishina.riken.jp/UsersGuide/NP-PAC>.

The schedule of the 5th Material and Life science PAC meeting is now being discussed. The details will be announced in the next RIBF Quarterly.

### Beam Time Requests

We will start to call for beam time requests for the latter half of this fiscal year, from Oct. 2009 to March, 2010. The "call for beam time requests" will be sent in the beginning of July to all the spokespersons of the PAC approved experiments.

At the same time, we will also call for requests of "Detector Development Beam Time" dedicated to detector development activities using the AVF in the stand-alone operation. The call will be sent to all the RIBF users.

## User Group Activities

The town meeting of RIBF Users Group was held in March 27 at Rikkyo University during the JPS annual meeting. Slides used in the meeting are available at [http://ribfwww.riken.jp/exp/RIBF\\_uec\\_eng](http://ribfwww.riken.jp/exp/RIBF_uec_eng).

The UEC meeting was held on April 15 at RIBF. The minutes will be posted by the UEC members.

## Recent News and Research topics of RIBF

### Research Incentive Awards of RIKEN for FY2008

T. Ohnishi, H. Takeda, N. Fukuda, D. Kameda and Y. Yanagisawa (BigRIPS team)

*"Identification of New Isotopes  $^{125}\text{Pd}$  and  $^{126}\text{Pd}$  produced by In-flight Fission of  $^{345}\text{MeV/nucleon } ^{238}\text{U}$ "*

M. Ito (Theoretical Nuclear Physics Lab.)

*"Unified studies of chemical-bonding structures and reaction dynamics in the highly-excited states of Be isotopes"*

### Additional strong evidence of the Z=113 discovery

A series of  $^{266}\text{Bh}$  production experiments,  $^{23}\text{Na} + ^{248}\text{Cm} \rightarrow ^{266}\text{Bh} + 5n$ , has been conducted from the end of Dec. 2008 to the end of Feb. 2009 through the new-year holidays. The nucleus  $^{266}\text{Bh}$  appears as the great-grand daughter of  $^{278}113$  in its decay chain discovered by a research group at RIKEN. Over 20  $^{266}\text{Bh}$  events have been produced and the decay properties of  $^{266}\text{Bh}$  and its daughter nucleus  $^{262}\text{Db}$  have been studied in details. The decay properties were found to be consistent with those observed in the  $^{278}113$  decay chain, which provided a further confirmation of the production and

identification of the isotopes of the 113th element. The paper is in press.

### Direct observation of carrier trapping on $^{57}\text{Fe}$ impurities in multi-crystalline Si solar cell under light illumination

Using energetic  $^{57}\text{Mn}$  secondary beam produced by RIPS, Y. Yoshida (Shizuoka I.S.T.) and his collaborators successfully observed drastic changes of the Moessbauer spectrum of  $^{57}\text{Fe}$  deeply implanted in multi-crystal solar cells under light illumination. The carrier trapping process by Fe impurities in the solar cells is considered to be one of the main reasons of the degradation of the power generation efficiency of the solar cells. Their research will shed lights on how Fe impurities are harmful in solar cells.

### First demonstration of an electron scattering experiment with SCRIT

Further progress of the SCRIT development has been recently published, PRL 102 (2009) 102501. Using the novel SCRIT technique, the measurement of elastic electron scattering has been successfully performed for the first time with much improved luminosity. The SCRIT group published two PRL papers in FY2008.

**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/](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>