Minutes of the 54th Machine-Time Committee Meeting

Date and time: April 20, 2012; 13:30–15:10

Place: RIBF Bldg., Room 203

Attendees: Sakai [a] (Chair), Abe [a], En'yo [a, †], Fukunishi [a], Haba [a, †], Kamigaito [a], Kase [a], Kubo [a], Morita [a], Motobayashi [a, †], Nishimura [a, †], Okuno [a, †], Shimoura [b], Suda [c, †, ‡], Ueno [a], Uesaka [a], Uwamino [a], Wakasugi [a], Yamaguchi [b], Yoneda [a, †]

Absent: Sakurai [a], Yoshida [a, †]

[a] RNC / [b] CNS / [c] RIBF-UEC / [†] Observer / [‡] TV Attendee

(in random order)

Reports

1. **Status of beam-time operation** (Ueno)

   The beam times (BTs) were conducted as scheduled last month.

2. **RIBF operation** (Fukunishi)

   - The accelerator status of the delivery of ^{18}O beams from March to April was reported. In the first series, where ^{18}O beams were delivered at the energy of E/A = 294 MeV, 95.6 % of the requested BT was delivered (183.6 hours / 192 hours). In the next series, E/A = 230 MeV, the accelerators were again operated very reliably with 95.6 % of the requested BT being delivered (514.5 hours / 536 hours).
   - RRC trouble

     It was reported that a vacuum trouble occurred in the RRC cavity at the beginning of the ^{238}U BT in the Machine-Study (MS) category scheduled immediately following the ^{18}O series. Details of the trouble are being investigated.

3. **BigRIPS operation** (Kubo)

   - It was reported that the following secondary beams were delivered in the ^{18}O beam series from March to April:
     - Facility Inspection (Mar.16): ^{16}O
     - SAMURAI commissioning (Mar.16–23): A/Z=2 cocktails, p, $^{10\text{-}12,14}$Be, ^{15}B, $^{10\text{-}12,\ 14\text{-}17}$C
     - EURICA commissioning#1 (Mar.28–31): ^{12}B, ^{16}N
     - SHARAQ (Mar.31–Apr.15): CNO cocktails, ^{8}He
     - EURICA commissioning#2 (Apr.15–18): ^{14}Be+^{15}B, ^{17}B
     - BigRIPS MS-Exp-12: ^{14}O
   - During this series, the cryogenic refrigerators equipped with Superconducting Triplet Quadrupole magnets (STQ) 6, 8 broke down while the one with 13 malfunctioned. The refrigerator of STQ13 is still working, although its condition is unstable. After replacing two of them with the spares, the BigRIPS team requested the manufacturer to find out the cause of the trouble.

4. **R&D study of the first-stage charge stripper for Kr beam deliveries** (Okuno)

   The following subjects were investigated in the BT of MS11-1:

- Carbon-foil charge stripper

  The charge of Kr ion beams should be increased from $q = 18^+$ to 26^+ at the first stage (E/A = 2.7 MeV) and $q = 26^+$ to 34^+ at the second stage (E/A = 46 MeV). In the R&D study, a significant enhancement of the endurance time of a carbon foil up to as long as 18 hours, was observed by introducing new beam slits made of tantalum instead of graphite. With this however, a change in the beam phase was observed at the exit of RILAC. The same problem is expected with a Zn beam. The stability of the beam transportation should be investigated for the entire cyclotron cascade acceleration mode.

- H_2-gas charge stripper

  A high charge state, $q = 25^+$, was obtained for Kr utilizing a H_2-gas charge stripper. The difference between the high charge state obtained with a carbon foil is only $\Delta q = 1^+$. As expected, the suppression effect of the electron capture process with a low-Z gas was observed, suggesting the feasibility of the H_2-gas charge stripper.

5. SAMURAI commissioning (Yoneda)

The following subjects were studied in the MS11-10 BT (Mar.16-23):

- Secondary-beam transportation: The best transportation mode was determined through the measurement of effective acceptance and resolutions of the proposed three modes.
- Neutron detector array NEBURA: A performance evaluation of NEBURA was carried out through the measurement of γ rays and neutrons utilizing the ^{15}C+Cu and p+Li reactions. Sufficiently high performance was confirmed in the measurement.
- SAMURAI magnet: Properties of the magnet was studied by measuring eight different particle trajectories under the three settings of the magnetic field B = 2.0, 2.5, and 3.0 T. A position resolution of 3 cm and an angular resolution of 14 mrad were obtained.
- Entire performance test: The test was performed utilizing the ^{17}C+C and ^{15}C+Pb reactions based on the invariant mass spectroscopy.

6. EURICA commissioning (Nishimura)

The performance of the EURICA system was tested twice with ^{18}O beams at E/A = 230 MeV. In the BT of MS11-16 (Mar.28–31), the isomeric state in ^{16}N was immediately identified, where its half-life $t_{1/2}$ = 5.25 μs was accurately measured. An obtained energy resolution of the EURICA Ge detector array was 2–3 keV. Also, the time-stamping data acquisition systems which differed depending on the EURICA/BigRIPS detectors were successfully combined. In the next BT of MS11-17 (Apr.15–18), further performance test was carried out through the β-γ measurement with ^{17}B, whose β decay is known to be followed by the β-delayed neutron emission with up to four neutron multiplicity. The system performance will be evaluated in detail through the off-line analysis. Preparations for the first EURICA BT scheduled for June will be completed after i) the check of the efficiency and the fast timing and ii) the installation of the Munich's Si detectors. For the BTs of the ^{238}U beam series scheduled for this autumn and winter, the readout electronics for the Si detectors will be prepared.

7. **Construction of Rare RI Ring and its influence on the FY2012 BT schedule** (Wakasugi)
   - The relevant infrastructure constructions will be scheduled in the first half of FY2012 which will not affect the BT operation. The bending magnets of Rare RI Ring will be tentatively placed at the SHARAQ site in August.
   - The main construction of Rare RI Ring will start from September, where a stage of concrete will be first constructed from September to November. This work will not affect SHARAQ BTs. SAMURAI BTs, however, cannot be conducted during this period since the north carry-in entrance will be occupied by this work. The construction of Rare RI Ring on stage will be continued until the end of FY2012. Since the north carry-in entrance will be used for this work as well from time to time, both the BT and the construction schedules in the second half of FY2012 should be well arranged and adjusted for their smooth operations.

8. **Dealing with the EURICA-related four proposals, RIBF10, RIBF49R1, RIBF80, and RIBF90** (Ueno)

   The representatives of the aforementioned proposals requested that i) the four experiments should be separated into two BT slots, RIBF90+RIBF10 (7.5 days + 11 days → 16 days by sharing a part of the data) and RIBF80+RIBF49R1 (total of 7 days in parallel), although it has been recommended in the PAC report to incorporate the four programs in one BT slot for an efficient BT use, and that ii) the grade of the combined BTs should be the same as the grade given at the time of approval even when the four programs are divided into two. Understanding the difficulty incorporating the four programs due to the differences in the BigRIPS setting and in the trigger rate acceptable for each detector configuration, the RNC and CNS directors accepted the requests.

9. **Strategic plan of SHE researches** (Sakai)

   It was reported that a meeting to discuss a future plan of the SHE researches was held on April 10.

10. **Status of PAC meetings** (Ueno)
    - 11th NP-PAC (June 18–19): The call-for-proposals has been opened (submission deadline is May 2).
    - 9th ML-PAC: The PAC meeting schedule is being deliberated to be held sometime in June or July. It would be desirable to set the schedule so as to make it in time for the call for BT scheduling requests for the second half of FY2012.
    - 3rd In-PAC: The PAC meeting schedule is being considered to be held at the end of June.

<u>Topics discussed</u>

1. **Approval of the minutes of the previous meeting** (Sakai)

2. **Outline of the BT schedule for the second half-year of FY2012** (Sakai)
   - A plan for the beam delivery in the SRC-based experiments in the second half of FY2012 was discussed in which the beams of ^{238}U, ^{124}Xe, and light charged particles are being considered. Discussions were also made about the some constraints in the BT scheduling such as the construction of Rare RI Ring, and BTs in the MS category for accelerator developments. The discussions will

continue.

- Nishimura, the EURICA Project Manager, has been assigned as the coordinator of the EURICA BT series. Based on the above consideration, the total BT of the EURICA series was tentatively set for the second half of FY2012.

3. Next meetings

- The next meeting will be held on Friday, May 18, 2012, at 13:30
- The meeting after the next will be held on Friday, June 15, 2012, at 13:30