Minutes of the 57th Machine-Time Committee Meeting)

Date and time: July 20, 2012; 13:30–15:25

Place: RIBF Bldg., Room 203

Attendees: Sakai [a] (Chair), Abe [a], En'yo [a, †], Fukunishi [a], Haba [a, †], Kamigaito [a], Kase [a], Kubo [a], Miyatake [c, †], Motobayashi [a, †], Nishimura [a, †], Shimoura [b], Suda [d, †], Ueno [a], Uwamino [a], Wakasugi [a], Yamaguchi [b], Hirayama [c, †], Imao [a, †], Okuno [a, †], A. Yoshida [a, †]

Absent: Morita [a], Sakurai [a], Uesaka [a], K. Yoshida [a, †]

[a] RNC / [b] CNS / [c] KEK / [d] RIBF-UEC / [†] Observer

(in random order)

Reports

1. Changes of the beam-time schedule (Ueno)

It was reported that the beam-time (BT) schedule in June and July had been changed as follows due to the extension of BigRIPS-based BTs (^{124}Xe and ^{70}Zn beams) and the power saving measures at Wako campus.

Exp.-Prog.-Num.	previous		changed
SRC:			
NP1112-RIBF83-01 (Boutachkov)	Jun 18, 9:00 – Jun 25, 9:00	→	Jun 18, 9:00 – Jun 29,0:00
NP1106-RIBF74-01 (Obertelli) NP0811-RIBF70R1-01 (Doornenbal)	Jun 25, 21:00 – Jun 27, 21:00 Jun 28, 9:00 – Jul 2, 9:00	→	Jun 30, 0:00 – Jul 5, 12:00
MS-ACC12-05 (Fukunishi)	Jul 3, 9:00 – Jul 8, 9:00	→	Jul 5, 12:00 – Jul 8, 12:00
RILAC standalone:			
NP0702-LINAC12-16 (Morita)	Jun 12, 9:00 – Jul 3, 9:00	→	Jun 12, 9:00 – Jul 2, 9:00
AVF standalone:			
DD12-01 (Ishibashi)	Jul 9, 9:00 – Jul 11, 9:00	→	Jul 18, 21:00 – Jul 20, 21:00

2. RIBF operation (Fukunishi)

- ^{124}Xe beam delivery: Trouble occurred in the vacuum system and the charge-stripper system at the beginning of the ^{124}Xe beam series which took 3 days to recover. The beam current was as high as I ~ 27 pnA. To keep this current, the charge stripper foil was replaced frequently. The beam delivered was 78.1% of the user time.
- ^{70}Zn beam delivery: The beam acceleration was conducted as a BT in the Machine Study (MS) category, because this is the first ^{70}Zn beam acceleration using SRC. In the subsequent user's BT, the beam was delivered at I ~ 80–100 pnA for 91.7% of the BT, indicating high stability of the accelerator system. The fixed-type charge-stripper system was operated, where five carbon foils were consumed in total.
- In the continuous SRC operation that started from the polarized deuteron beam in February, 2012 up to the above-mentioned ^{70}Zn beam in July, 2012, the overall beam-delivery ratio was as high as 88.3%. It was noted that beams were delivered for 5,315 hours out of 7,177 hours; the count was

done by excluding down times due to accelerator trouble from the total BT scheduled from November, 2008, indicating that beams delivery rate reached 74% in the past few years.

3. **R&D of the He-gas charge-stripping system** (Imao)

In the BT of the MS-ACC12-04 (Imao), a performance test of fRC which has been recently modified, was first conducted with a $^{238}U^{65+}$ beam, and the desirable accelerator performance was obtained. Subsequently, a performance test of the He-gas charge-stripping system was conducted. The stability of the actual operation was evaluated in the three day continuous runs including a run with a high current beam at I = 10 eμA for one day. There were no problems observed in the heat load and radioactivity in its components such as orifice, He gas, and vacuum pumps. In contrast to the rotational charge-stripping system currently being used that has had a problem with the charge-stripping efficiency due to the damage of stripper foils, the He-gas charge-stripping system did not show any such problem. In particular, it was confirmed that the stability of charge-stripping efficiency is one order higher than that of the rotational charge-stripping system in terms of the long-term phase stability in the beam acceleration. The fRC tuning time will be shortened and its transmission efficiency will be improved by introducing the He-gas charge-stripping system. Preparations for the actual operation in the upcoming autumn will continue, during which time some spare parts and components will be supplied and an interlock system will be installed.

4. **MS for industrial cooperation programs** (A. Yoshida)

In the BT of MS-EXP12-03, a high-current low-energy ^{7}Be secondary beam was developed using CRIB. The beam will be implanted into a 50-μm depth in the surface layer of materials as an RI probe in the main experiments. The ^{7}Be secondary beam was produced at E/A = 4 MeV through the $p(^{7}\mathrm{Li}, ^{7}\mathrm{Be})n$ reaction using a ^{7}Li primary beam at I = 1 pμA incident on a hydrogen gas target. An obtained production yield $I = 2\times10^{8}$ pps can well be reproduced by a cross section given in the literature data, suggesting that the radioactivity of 10 kBq can be produced for 1 hour. In the experiment, the hydrogen gas target system operated stably, and it took just 6 hours to complete procedures for the RI production. It was shown in this MS that the radioactivity of ^{7}Be (halflife is $t_{1/2}$ = 57 d) can be produced with CRIB as much as that of ^{22}Na($t_{1/2}$ = 2.6 y) produced so far with E6-RIPS. Now, a suitable radioactivity can be chosen based on the lifetime of the probes depending on the elapsed time to be observed. It was noted that the charge for use is just 1/5 of the MT using RIPS because CRIB is operated on a standalone mode of AVF.

5. **Status of the BT scheduling for the second half of FY2012** (Ueno)

According to the BT scheduling policy discussed up to the previous meeting, the BT for the second half of FY2012 (from October 1, 2012 to January 31, 2013 to be precise) will be determined in the following schedule. The applications for the BT scheduling requests are now being accepted.

- Jun. 25–Jul. 2：NP-PAC report to the RNC & CNS directors, its approval by the directors, and delivery of PAC results to the spokespersons.
- Jul. 6–24：Call for BT scheduling requests & detector development BT requests
- Early–Mid of Aug.: A tentative BT schedule by a working group formed under the MT

Committee

- Mid–End of Aug.: Submission deadline of Accelerator-Use Planning Sheet (AUPS)
- Sep. 1–10: Preliminary document screening of AUPS by the In-House Safety Review Committee
- Sep. 11 : In-House Safety Review Committee meeting
- Sep. 21 : Approval of BT schedule by the MT Committee

6. Status of PAC meetings (Ueno)

- NP-PAC: 11th NP-PAC meeting was held on June 18–19 as scheduled. Result: "A"-grade approvals 45.75 days / proposed 88.75 days (52% in days). Of which 39.75/82.75 days (48%) were approved for BigRIPS-based experiment,. It was announced the 12th NP-PAC will be held on Dec. 10–11.
- 9th ML-PAC: It was reported in the RNC Coordination Committee Meeting held on June 14 that more than half of the ML-PAC members had been changed. The schedule of the PAC meeting was fixed for September 4–5. The call-for-proposals was distributed on July 6.
- The PAC meeting schedule is being deliberated to be held in early September.
- 3rd In-PAC: The meeting was held on July 2 as scheduled. One proposal was accepted.

Topics discussed

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

2. Review of proposals in the Machine Study category for the second half of FY2012 (Sakai)

- KISS R&D (Miyatake)

  The BT requests for R&D studies on KISS (KEK Isotope Separation System) in the MS category carried forward from the previous meeting were reviewed again, where the following three MSs were proposed:

  1) One to two days requested for a measurement of the space-charge effect on the efficiency/selectivity of KISS as a function of the beam current using an ^{56}Fe beam (E/A = 90 MeV, I = 10 pnA).
  2) Two days requested for the same measurement as 1) using an ^{56}Fe beam (E/A = 90 MeV, I = 10 pnA) or a ^{58}Ni beam (E/A = 63 MeV, I = 10 pnA) by installing an improved new chamber to reduce the plasma effect.
  3) Two days requested for the same measurement as 1) using a ^{124}Xe beam (E/A = 10 MeV, I = 10 pnA).

  After discussions, 1) and 2) were approved, but 2) was deferred. It was noted from the Accelerator Group that a beam diagnostics system should be fully equipped to deliver a beam to the E2 experimental room

- BigRIPS Ion Optics R&D (Kubo)

  An MS study of 8 hours was proposed to investigate the following two secondary beam transportation modes of BigRIPS required to determine a mass of RI of interest through the TOF

measurement.

- BigRIPS (F5 high-resolution mode) + ZD (standard mode)
- BigRIPS (standard mode) + ZD (high-resolution dispersive mode)

With these modes, an A/q resolution twice as better can be achieved. In this case, for instance, a mass resolution $\Delta A/A \sim 1\times10^{-6}$ can be obtained with 40k counts statistics. After discussions, the proposal was approved.

3. **Official BTs provided to the BigRIPS-based experiments in June–July** (Sakai)

Details of the BT statistics in the experiments using a ^{124}Xe beam conducted from June 18 to July 5 and a ^{70}Zn beam from July 10 to 13 were reported (Ueno). After discussions, the official BTs provided from the facility to each experimental program were calculated as follows:

- NP1112-RIBF83-01 (Boutachkov) : 6 days
- NP1106-RIBF74-01 (Obertelli) : 2 days
- NP0811-RIBF70R1-01 (Doornenbal) : 4 days
- NP1106-RIBF73-01 (Steppenbeck) : 3 days

4. **Modification of the approved experiments** (Sakai)

The following three proposals to modify experimental condition of the approved experiments were submitted to the RNC directors and the MT Committee chair by the representative of each program. The director consulted with the MT Committee on part of these requests.

- NP1112-SAMURAI08R1 (Otsu): the change of the primary beam was requested.
  - The Committee recognized the necessity for the change. The request was approved.
- NP0709-RIBF40 (Terashima): i) the change of the primary beam and ii) an additional measurement at the different beam energy using 30% of the approved BT were requested.
  - Regarding ii), the spokesperson was requested to submit it as a new or updated proposal (En'yo). Following this request, i) was discussed by the MT Committee. The Committee acknowledged the necessity to change primary beam, and the request for change was approved. However, the Committee considered that the originally proposed measurement can be conducted using only 70% of the approved BT. The BT was, therefore, reduced to 4 days by cutting back 30% of MT. There was a comment from the Accelerator Group suggesting that the beam energy proposed in ii) has not yet been tested (Kamigaito).
- NP0906-RIBF03 (Fallon): i) the change of the secondary beam and ii) measurement through a different reaction path using the modified secondary beam were requested.
  - The Committee recognized the necessity and the validity of the requests, and approved.

5. **Experiments waiting for beam developments** (Sakai)

The experimental programs proposing to use the beam not given in the available beam list have been put on hold for a long time. Most of them had already been approved prior to the introduction of the in-house technical review where the feasibility of the requested beams was checked. This situation could not be easily improved due to a long-term BT currently running, where the ion source is always in operation, and

man power for beam developments is limited. Moreover, the priority of the beams to be developed mostly depends on the research strategy of RNC. The beam development is thus not always conducted according to the users' request. A beam-development plan and its timeline will be announced to the spokespersons concerned after they are made more clear.

6. Next meetings

- The meeting will be held on Friday, September 21, 2012, at 13:30 (it will be adjourned during August unless an extraordinary meeting is convened.)
- The meeting after the next will be held on Friday, October 12, 2012, at 13:00