

Agenda  
International Advisory Committee (IAC) Meeting  
RIKEN RI Beam Factory Project  
November 18-20, 2004 at RIKEN

**Nov. 18<sup>th</sup> (Thu.)**

*Hotel Cadenza Hikarigaoka, Azalea Room*

17:00 Preliminary Meeting chaired by Y. Yano

- Introduction of IAC Members and RIKEN staff
- Distribution of Meeting Agenda
- Welcome Address and Introduction to the RIBF Project  
Director of Discovery Research Institute: K. Kaya
- Background

- 1) RIKEN was re-established as an Independent Administrative Institute (IAI) in October 2003.
  - 2) The first President: R. Noyori.
  - 3) IAI's are required to operate on five-year term programs.
  - 4) In RIKEN's five-year program, we plan to achieve the following by the end of FY 2007:
    - (1) In FY 2006 the on-going RIBF phase I project will achieve a national first in uranium beam acceleration, and will initiate experiments aimed at greatly expanding our understanding of nuclear science.
    - (2) We will also undertake, after peer review and as a part of RIBF phase II, construction of additional major experimental installations.
  - 5) This IAC review is a necessary step in formulating a new budget for the proposed major experimental installations in the RIBF phase II project.
- Terms of Reference:

- 1) Review of the program for upgrading the present heavy-ion accelerator system to act as an injector for the RI beam (RIB) generator of the RIBF
- 2) Review of the on-going progress of the RIB generator construction project
- 3) Review of the proposed "Day-one" experiments
- 4) Review of the proposed major RIBF experimental installations, as well as the experiments proposed for them, in terms of priority, scientific benefit and cost performance
- 5) Recommendations and suggestions for successful progression of the RIBF project in terms of manpower, budget, organization and possible international collaboration schemes.

17:30 Welcome Buffet Party

19:00 IAC Closed Session ( at the Gerbera Room)

Nov. 19<sup>th</sup> (Fri.)

1<sup>st</sup> Cafeteria 2F Conference Hall at Wako Campus

08:30 IAC Members leave the Hotel for RIKEN

**Morning session (9:00-12:30) chaired by T. Motobayashi**

09:00 Welcome Address by the President of RIKEN (15 min.) R. Noyori

09:15 Overview of the RIBF project Y. Yano

(100 min. for presentation & 20 min. for discussion)

- Layout of the present facility (RARF) and the RIBF (changes since the last IACmeeting)
- New high-power heavy-ion beam accelerator system for intense RI beam generation RARF heavy-ion accelerators and new cyclotrons (fRC+IRC+SRC)
- Present status of the RARF and its near-future upgrading program for realizing one particle micro ampere of 350 MeV/u primary beams in the RIBF: 28 GHz ECR ion source, Charge-stripper, etc.
- Expected primary beam intensities in the initial operation: e.g. 1 pA for light ions and <sup>86</sup>Kr at 350 MeV/u, and 0.3 pA for <sup>136</sup>Xe at 350 MeV/u, and ~0.01 pA for <sup>238</sup>U at 350 MeV/u
- Proposal for a new additional heavy-ion injector linear accelerator to the RRC to make it possible to concurrently conduct the RIBF experiment and the super-heavy element experiment
- In-flight separator Big RIPS and its upgrading program for realizing one particle micro ampere of 350 MeV/u primary beams: 100 kW high-power beam dumper
- Expanding the horizons of the nuclear world on the nuclear chart by the Big RIPS in the initial operation and in the near future: expected RIB intensities, e.g. for <sup>78</sup>Ni, ~0.1 cps in the initial operation and ~10 cps in the near future by 1 pA 350 MeV/u <sup>238</sup>U beam
- Zero-degree spectrometer in the RIBF phase I
- Construction schedule of the RIBF phase I (timetable and budget)
- Proposal for the RIBF phase II - major experimental installations - (timetable and budget)
- Proposal for a new organization "Heavy-ion accelerator research center (RARC)" (organization, man-power, operation budget, IAC, PAC, international collaboration as the Asia regional center, etc.)
- Introduction to technical tour of the RARF and the RIBF now under construction

11:15 *Coffee Break* (15 min.)

11:30 *Technical Tour* (60 min.)

12:30 *Lunch with discussion at Hirosawa Club, 2F*(90 min.)

**Afternoon session (14:00-17:00)** chaired by Y. Yano

14:00 Proposed major experimental installations in the phase II and the scientific opportunities this will permit (90 min.) T. Motobayashi

- Layout of proposed experimental installations in RIBF phase II
  - Recent achievement highlights (including SHE and heavy-ion beam plant breeding)
  - Day one experiments with Big RIPS and Zero-degree spectrometer
  - Some details of each proposal (principle, specification, reality, science, cost estimate)
- i. Zero-degree spectrometer project led by H. Sakurai (Univ. of Tokyo)
    - In-beam gamma spectroscopy by direct reactions / fusion
    - Missing mass spectroscopy by proton elastic scattering / giant resonance studies
    - Reaction mechanism of fusion and fission
  - ii. Large-acceptance superconducting spectrometer projects
    - a. Led by T. Kobayashi (Tohoku Univ.)
      - Collective and single-particle properties of unstable nuclei
    - b. Led by T. Nakamura (TIT)
      - Spectroscopy of neutron unbound states
    - c. Led by T. Uesaka (CNS)
      - Study of few-body system with polarized deuterons
    - d. Led by N. Iwasa (Tohoku Univ.)
      - Coulomb dissociation of astrophysical interest
    - e. Led by T. Murakami (Kyoto Univ.)
      - Nuclear equation of state
  - iii. Gas catcher and rf ion guide system (SLOWRI) project led by M. Wada (RIKEN)
    - Mass measurement with the multi reflection time-of-flight (MR-TOF) spectrometer
    - Charge radii of unstable nuclei studied by the collinear laser spectroscopy
    - Neutron distribution of trapped ions probed by the Bohr-Weisskopf effect
    - Nuclear surface structure probed by antiprotonic RI atoms
    - Possible ion-source of the SCRIT system
  - iv. Development project of new material science probe: Utilization of high-intensity low-to medium-energy polarized RI beam generated with the RIPS newly connected to the return beam line from the IRC, led by K. Asahi (TIT)
    - Magnetic and electric quadrupole moments of unstable nuclei
    - Hyperfine structure of condensed matter probed by RI spins
    - Fundamental symmetry studies with spin-oriented nuclei
    - Beta-gamma spectroscopy for nuclear structure studies
  - v. High resolution RI beam spectrometer (SHARAQ) project led by S. Shimoura

(CNS) Double Gamow-Teller states by RI-induced double charge-exchange Neutron nugget production by RI-induced double charge-exchange Indirect mass measurement by the reaction Q-value

Vi. Proposal and conceptual design of new precision mass measurement scheme for rare RI ions with isochronous ring and individual injection, led by A. Ozawa (Tsukuba Univ.) Mass measurement of rare and short-lived nuclei Isomer-free nuclear spectroscopy

Vii. Proposal and conceptual design of new electron scattering experiment scheme for RI ions with SCRIT and ISOL, led by M. Wakasugi and T. Suda (RIKEN) Electron-RI scattering

Viii. Pionic atom spectroscopy led by K. Itahashi (RIKEN)

ix. SHE search and their chemistry led by K. Morita and H. Haba (RIKEN)

15:30 *Coffee Break* (15 min.)

15:45 Discussion (75 min.)

Y. Yano

T. Motobayashi

17:30-19:30 *Presidential Reception* chaired by Y. Yano

(Hirosawa Club, 2F) Welcome:

R. Noyori

Toast:

K. Kaya

**Nov. 20<sup>th</sup> (Sat.)**

*1<sup>st</sup> Cafeteria, 2F Conference Hall at Wako Campus*

08:30 IAC Members leave the Hotel for RIKEN

**Morning session (9:30-12:30)** chaired by T. Motobayashi

(additional research details)

09:00 Zero degree spectrometer (20 min. & 10 min.) H. Sakurai

09:30 High-resolution RI beam Spectrometer: CNS project (20 min & 10min.) S. Shimoura

10:00 Large-acceptance superconducting spectrometer (20 min. & 10 min.) T. Kobayashi

10:30 *Coffee Break* (15 min.)

10:45 Isochronous Ring for precision mass measurement (20 min. & 10 min.): A. Ozawa

11:15 Electron scattering system with SCRIT + ISOL (20. min. & 10 min.) M. Wakasugi

11:45 Extra time (45 min.)

12:30 IAC Members leave RIKEN for the Hotel

13:00 *Lunch* (60 min.) at *Hotel Cadenza, Lavender Room*

**IAC closed session and concluding discussion (14:00-17:00)**

**at the Hotel Cadenza, Lavender Room**

14:00 Executive Summary preparation  
(IAC and RIKEN)

17:00 Presentation of the Executive Summary and End of IAC meeting:  
S. Gales, IAC Chairperson