

Advancing physics at next RIBF (ADRIB24)

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The workshop on “Advancing Physics at Next RIBF (ADRIB24)”¹⁾ was held on January 23 and 24, 2024 at the Nishina Hall, RIKEN Nishina Center. The workshop aimed to share information related to the RIBF Facility Upgrade Project and enhance anticipation for the scientific challenges of the next-generation RIBF. Discussions were led primarily by young researchers in the fields of both theory and experiments.

The RIBF Upgrade Project involves significant enhancements to the RI Beam Factory. It includes the introduction of Charge Stripper Rings (CSRs) to improve beam transmission and increase uranium beam intensity up to 2,000 particle nA from the current maximum of approximately 100 particle nA. A white paper outlining the long-range plan was prepared by the RIKEN Nishina Center and presented to the Nishina Center Advisory Committee in July 2024, with public access provided in September 2024 via its official website.²⁾ ADRIB24 was organized as the initial meeting for the community to share information about the RIBF Upgrade Project and gather experimental and theoretical experts, especially from the younger generation, to discuss future physics opportunities at the RIBF.

A total of 25 presentations were delivered by invited speakers, comprising 12 experimentalists and 13 theoreticians. The main topics included:

- Overview of the RIBF Upgrade Project (M. Kimura, D. Suzuki)
- Reaction mechanisms for the production of RI beams at the BigRIPS fragment separator (H. Suzuki), and at OEDO utilizing decelerated RI beams (N. Imai)
- Isoscalar pairing and mirror symmetry of proton-rich nuclei near the $N = Z$ line (N. Hinohara, T. Naito)
- Structure near and beyond the neutron dripline by invariant mass spectroscopy at SAMURAI (Y. Kondo)
- Structure of heavy element isotopes: in-beam γ/e^- spectroscopy (S. Go), the spin-alignment technique (H. Nishibata), and *ab-initio* approaches (T. Miyagi)
- Decay and fission processes of nuclei in the heavy-mass region (K. Hagino, H. Koura)
- Nuclear equation of states probed by heavy-ion collision (T. Isobe) and by nuclear responses (S. Ota, K. Yoshida)

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Fig. 1. Photograph of the venue scenery in ADRIB24.

- Updates on neutron-star properties (K. Sekizawa)
- Generalized clustering in nuclei and extended approaches by knockout reactions (Y. Kubota, K. Yoshida)
- Updates and perspectives of in-beam γ -ray spectroscopy (P. Doornenbal)
- Octupole and hexadecapole deformation (K. Yanase, K. Nomura)
- Precision measurements and predictions of nuclear masses (H. Liang, M. Rosenbusch) and β decay (F. Minato)
- Tagging of isomeric states in the Rare RI Ring (Y. Yamaguchi) and proton scattering using isomeric beams (M. Dozono, W. Horiuchi)

A workshop dinner was held in the evening on the first day of the workshop. The two-day workshop concluded with a discussion session.

ADRIB24 had 105 registrants, approximately half of whom were young researchers in their 20s and 30s. Of the participants, 61% were experimental researchers, 36% were theoretical researchers in nuclear physics, and the rest were from accelerator physics and elementary particle physics. Participants originated from RIKEN (38%) and from various universities and research institutions both domestically and internationally.

ADRIB aims to be an annual series. The second edition ADRIB25 was held in January 2025. Proposals for topical mini-workshops are in progress, targeting groups of 10–20 participants for smaller-scale research discussions.

References

- 1) <https://indico2.riken.jp/event/4658>.
- 2) <https://www.nishina.riken.jp/researcher/RIBFupgrade>.