

Recent Physics results of RIKEN RIBF and Future Prospects

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RIKEN has provided fast radioactive isotope (RI) beams since 1990. The new facility of RIKEN RIBF (RI Beam Factory) started operation in the end of 2006, and various experimental studies using its high-intensity RI beams with energies around 200 MeV/nucleon have been performed. They include production of many new neutron-rich isotopes, lifetime measurements for several r-process nuclei, and Q-moment measurements with a noble technique for creating spin-aligned RI beams. Direct reaction experiments of inelastic, nucleon removal, charge exchange reactions in inverse kinematics were also conducted for spectroscopy of nuclei very far from the stability valley which could not be accessed so far.

These studies were performed with the BigRIPS fragment separator for producing fast RI beams, the ZeroDegree spectrometer for analysis of reaction products, the high-resolution spectrograph SHARAQ, and the NaI(Tl) based high-efficiency gamma-ray detector array DALI2. RIBF now hosts the RISING Ge detector array from GSI. The collaboration program called EURICA (EUro ball Riken Cluster Array) has started. The spectrometer SAMURAI for particle-correlation measurements was constructed. Several neutron-ion coincidence experiments for studying unbound states in light neutron-rich nuclei were made. In addition, the facility SR2 for electron-RI scattering using the idea of SCRIT (Self Confining RI Target) and the "Rare RI-ring" for mass measurements for rarely produce, hence very exotic, isotopes are under construction.

In near-term future, to conduct various experimental studies with world-strongest RI-beams is a major focus of RIBF. Several options for long-term facility upgrade options are being discussed.

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