

Tokai Radioactive Ion Accelerator Complex (TRIAC)

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An ISOL-based radioactive nuclear beam (RNB) facility, Tokai Radioactive Ion Accelerator Complex (TRIAC) [1], has been jointly developed by High Energy Accelerator Research Organization (KEK) and Japan Atomic Energy Agency (JAEA), and started to supply RNBs for experiments since 8th November, 2005. The radioactive nuclei are produced by means of proton-induced fission of ^{238}U and heavy-ion transfer reactions with the primary beams from the 20 MV JAEA tandem accelerator. They are ionized singly-charged and mass-separated with the Tokai-ISOL [2], and fed to a charge-breeding 18 GHz ECR (CB-ECRIS) [3]. The multi-charged radioactive ions are accelerated to the energy of 1.1 MeV/A at the maximum by two linear accelerators: a split-coaxial RFQ (SCRFFQ) linac and an interdigital-H type (IH) linac.

So far we have successfully accelerated the RNBs of ^8Li and ^{138}Xe , which are produced by the transfer reaction of the ^7Li primary beam and the proton-induced fission of ^{238}U , respectively. The ^8Li beam has been used in three different experiments: measurement of diffusion coefficients of the lithium ionic conductor LiGa, production of the polarized beam with tilted foils, and measurement of the reaction cross sections of $^8\text{Li}(d,t)^7\text{Li}^*$ and $^8\text{Li}(d,\alpha)^6\text{He}^*$ of astrophysical interest. The typical intensity of the ^8Li beam was 100 kHz.

We are planning to connect the IH linac to an existing superconducting (SC) linac to increase the energy of the RNBs up to 5~8 MeV/A. The construction of the transport line and the remodeling of the first stage of the SC linac for velocity matching to the IH linac are proceeding now. Figure 1 shows the whole system of the RNB facility with the SC linac.

The status of the facility and an overview of the on-going experiments will be presented.

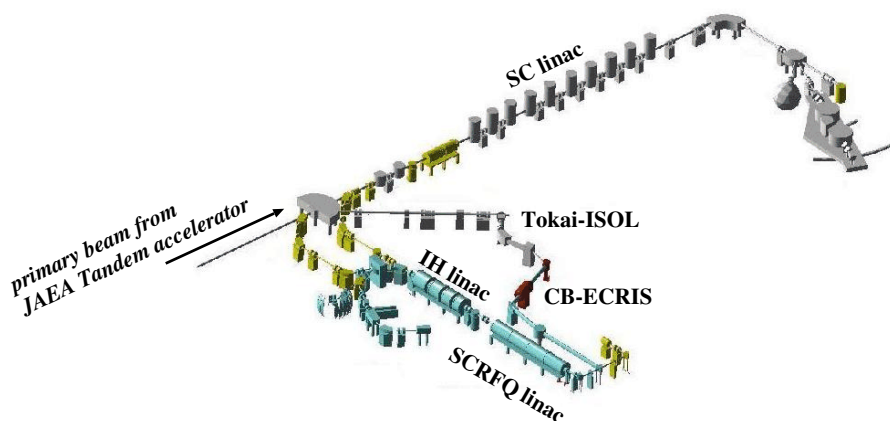


Figure 1: ISOL-based RNB facility at Tokai

[1] H. Miyatake et al., Nucl. Instrum. Meth. B204, 746 (2003), <http://triac.kek.jp/en/index.html>

[2] S. Ichikawa et al., Nucl. Instrum. Meth. B204, 420 (2003).

[3] S.C. Jeong et al., Rev. Sci. Instrum. 75, 1631 (2004).