

## Safety Management Group

### 1. Abstract

The RIKEN Nishina Center for Accelerator-Based Science possesses one of the largest accelerator facilities in the world, which consists of two heavy-ion linear accelerators and five cyclotrons. This is the only site in Japan where uranium ions are accelerated. The center also has electron accelerators of microtron and synchrotron storage ring. Our function is to keep the radiation level in and around the facility below the allowable limit and to keep the exposure of workers as low as reasonably achievable. We are also involved in the safety management of the Radioisotope Center, where many types of experiments are performed with sealed and unsealed radioisotopes.

### 2. Major Research Subjects

- (1) Safety management at radiation facilities of Nishina Center for Accelerator-Based Science
- (2) Safety management at Radioisotope Center
- (3) Radiation shielding design and development of accelerator safety system
- (4) Obtaining permissions for changes accelerators and use of radioisotopes

### 3. Summary of Research Activity

Our most important task is to keep the personnel exposure as low as reasonably achievable, and to prevent an accident. Therefore, we daily patrol the facility, measure the ambient dose rates, maintain the survey meters, shield doors and facilities of exhaust air and wastewater, replenish the protective supplies, and manage the radioactive waste. Advice, supervision and assistance at major accelerator maintenance works are also our task.

Permissions from Nuclear Regulation Authority of Japan for the Radioisotope Production beamline and additional quantity of unsealed radioisotope astatine-211 was obtained. Safety measures were conducted in the Radioisotope Experimental building owing to the increased use of alpha-emitting nuclides. Measures for the Covid-19 infection in Nishina center were also conducted. A fire drill by a small group of emergency response personnel assuming Saturday, Sunday and nighttime hours were carried out with the general affairs section in RIKEN.

## Members

### Director

Kanenobu TANAKA

### Technical Scientists

Rieko HIGURASHI  
Hisao SAKAMOTO

Hiroki Mukai

### Expert Technician

Atsuko AKASHIO

### Visiting Scientists

Toshiya SANAMI (KEK)  
Kenta SUGIHARA (KEK)  
Hiroshi YASHIMA (Kyoto Univ.)

Nobuhiro SHIGYO (Kyushu Univ.)  
Eunji LEE (KEK)

### Administrative Part-time Workers

Kimie IGARASHI  
Satomi IIZUKA  
Miyabi MURATA

Naoko USUDATE  
Tokie KUDO

### Temporary Staffing

Ryuji SUZUKI

### Assistant

Tomomi OKAYASU

## List of Publications & Presentations

### Publications

#### [Original Papers]

- K. Sugihara, N. Shigyo, A. Akashio, and K. Tanaka, "Measurement of neutron energy spectra of 345 MeV/nucleon  $^{238}\text{U}$  incidence on a copper target," Nucl. Instrum. Methods Phys. Res. B **512**, 102 (2022).
- K. Sugihara, N. Shigyo, E. Lee, T. Sanami, and K. Tanaka, "Measurement of thick target neutron yields from 7 MeV/nucleon  $\alpha$  incidence on  $^{209}\text{Bi}$ ," Nucl. Instrum. Methods Phys. Res. B **470**, 15 (2020).

**Presentations****[International Conferences/Workshops]**

- K. Tanaka (plenary), “Resent fire protection status at RIKEN RIBF cyclotron facility,” International Technical Safety Forum (ITSF2022), Meyrin, Switzerland, October 24–28, 2022.
- K. Sugihara (plenary), N. Shigyo, A. Akashio, and K. Tanaka, “Measurement of neutron production yields of 345 MeV/nucleon  $^{238}\text{U} + \text{Cu}$  with a time-of-flight method,” 15th workshop on Shielding aspects of Accelerators, Targets, and Irradiation Facilities (SATIF-15), Michigan, USA, September 20–23, 2022.