Spot

Heavy ion science and technology in RIKEN

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The Institute of Physical and Chemical Research (RIKEN) has a long history in developement and use of accelerators. In 1933, Y. Nishina built a Cockcroft-Walton generator and observed positron spectrum from ^{30}P produced by it. This was the first nuclear experiment in Japan using an accelerator. Then the first cyclotron in Japan was built by Y. Nishina and his collaborators in 1937 using Poulsen arc magnet of 23 tons. The pioneering works in nuclear physics, nuclear chemistry, and radiation biology were done using it.

Just after the completion of this small cyclotron, Nishina started the construction of larger cyclotron with a pole diameter of 60", which was one of the biggest cyclotrons in the world at that time. After seven years, in 1944, the second cyclotron was completed but due to the World War II, this was not used for research and destroyed together with the first one after the war. In 1952 the third cyclotron was constructed by using another Poulsen arc magnet. This cyclotron was used for RI production and especially for production of ^{15}O which was used to investigate the lung function of tuberculosis patients.

In 1966 the first heavy ion cyclotron in Japan was built in RIKEN. Although it was of a weak focussing type, a wide range of ion species from hydrogen to neon were accelerated by using this cyclotron. It had been used by researchers in the diversity of disciplines for more than 20 years and comprehensive and cooperative works in physics, chemistry, biology, and engineering had been pursued by using heavy ions. Mult-disciplinary and inter-disciplinary studies conducted using heavy ion beams are generically called here the "heavy ion science".

In 1989 RIKEN Ring Cyclotron facility was completed and began to accelerate heavy ions in the energy range from 7 MeV/n to 135 MeV/n. This new accelerator complex is one of the most powerful heavy ion accelerators in the world and is promoting pioneering works in the "heavy ion science". This isuue of RIKEN Review summarizes the recent results of heavy ion research in RIKEN.