

## Present status of the liquid-helium supply and recovery system†

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The liquid-helium supply and recovery system,<sup>1)</sup> which can produce liquid helium at a liquefaction rate of 200 L/h from pure helium gas, has been under stable operation since the beginning of April 2001. The volumes of liquid helium supplied each year from 2001 to 2015 are shown in Fig. 1. The volume gradually increased from 2001 to 2013, with two declines in 2009 and 2011. In 2014, the supplied volume decreased because of a malfunction of the system. In 2015, the supplied volume returned to its original supply volume.

The purity of helium gas recovered from the laboratories gradually improved after the construction of the system was completed. Currently, the impurity concentration in the recovered gas rarely exceeds 200 ppm. The volume of helium gas recovered from each building in the Wako campus as well as the volume transported to the liquid helium supply and recovery system were measured. The recovery efficiency, which is defined as the ratio of the amount of recovered helium gas to the amount of supplied liquid helium, was calculated.

The recovery efficiency for the buildings on the south side of the Wako campus, such as the Cooperation Center building of the Advanced Device Laboratory, Chemistry and Material Physics building, and Nanoscience Joint Laboratory building, increased to more than 90%.

At the end of November 2015, the system experienced a malfunction. We found an inflow of oil in the helium liquefier. One cause for the oil separator failure was deterioration due to age. We changed the oil separator of the recovery compressor in December 2016.

### Reference

1) K. Ikegami et al.: RIKEN Accel. Prog. Rep. 34, 349 (2001).

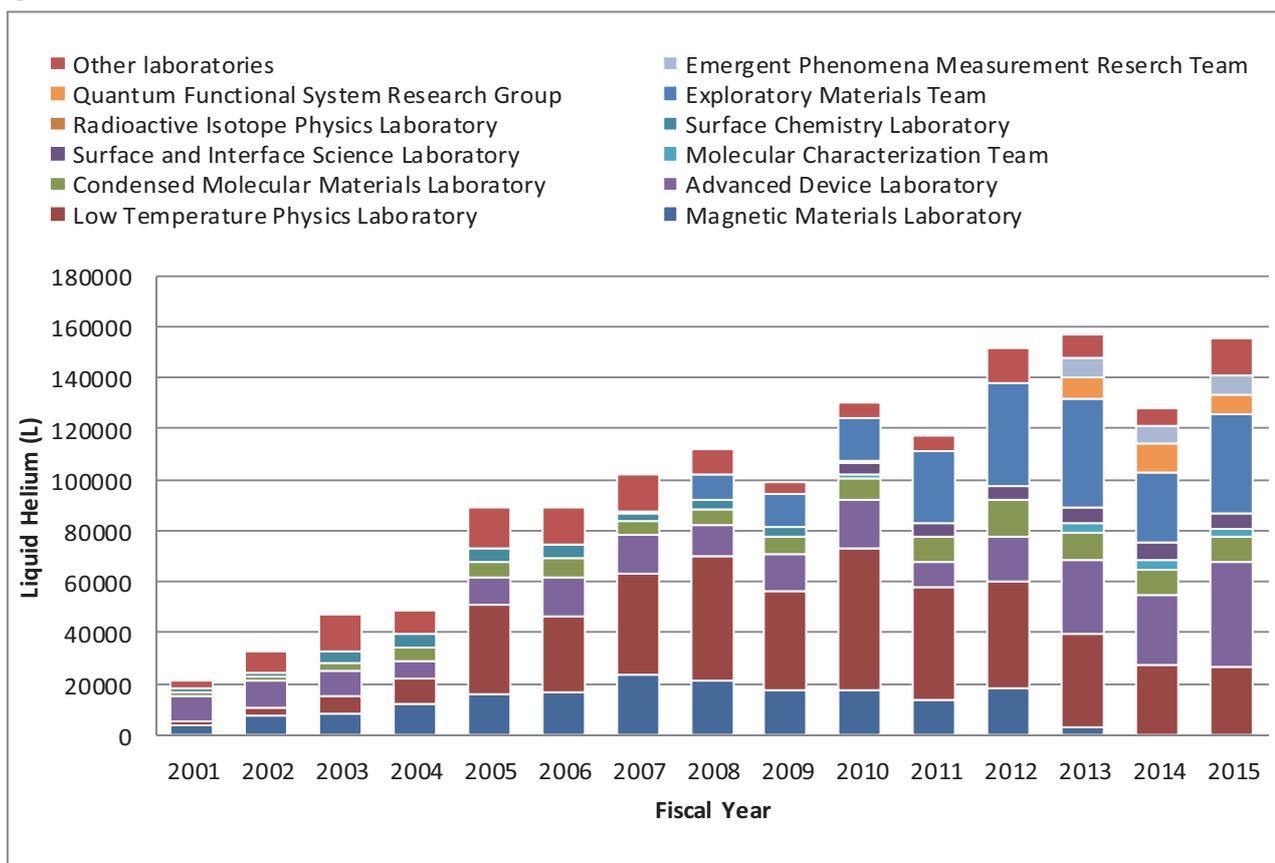


Fig.1. Volumes of liquid helium supplied to the various laboratories for each fiscal year from 2001 to 2015.

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