

**ELPH seminar**

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日時： 7月9日 ~~6月11日~~ (金) 15:00~16:30

場所： 電子光理学研究センター三神峯ホール

題目： Investigation on the slowing-down processes  
of heavy ions in gases and solids  
in the kinetic energy range of (30 to 300) MeV/u

**[Abstract]**

The energy loss of ions in matter was first investigated using natural radioactive sources. With the discovery of nuclear fission, interests in decelerating heavy ions increased significantly, and nowadays particle accelerators can accelerate ions from protons to uranium, which also have accelerated developments of particle experiments.

Fast ions can penetrate matters while depositing energies. This property is the basis of particle detectors and also of many applications, such as doping semiconductors or cancer therapy. Particularly, accurate knowledge of the atomic interaction of heavy ions is important for researchers whose measurement method relies on the energy-loss values.

This is the case for the successful operations of the in-flight separators FRS and Super-FRS of GSI in Germany, according to the  $B\rho - \Delta E - B\rho$  method with degraders. However, the theoretical uncertainties in the energy-loss estimation are presently too large and also the “gas-solid difference” of stopping powers and energy straggling is not yet solved.

In 2020, experiment of the accurate slowing-down measurement of lead ions ( $^{208}\text{Pb}$ ) in gaseous and solid targets was performed in GSI, targeting the gas-solid difference property with 5 incident beam energies and 10  $Z_2$ -targets (5 pairs of gaseous and solid target). In this seminar, the preliminary results will be reported.

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