



国立研究開発法人理化学研究所 仁科加速器科学研究センター  
第282回 RIBF核物理セミナー  
RIKEN Nishina Center for Accelerator Based Science  
The 282nd RIBF Nuclear Physics Seminar

Precision microwave spectroscopy of the ground-state hyperfine splitting in muonium atom

Dr. Kanda, Sohtaro  
(Iwasaki Meson Science Laboratory, RIKEN Nishina Center)

A hydrogen-like atom consisting of a positive muon and an electron is known as muonium. It is an ideal two-body system for a precision test of the bound-state QED theory and fundamental symmetries. In this seminar, a new precision measurement of the muonium ground-state hyperfine splitting (HFS) will be presented. The measuring precision of the muonium HFS had been statistically limited by a conventional method with the continuous muon beam. The experiment was the first trial of muonium spectroscopy with the high-intensity pulsed muon beam at J-PARC. To resolve the problems in the precursor experiments, the world's highest intensity pulsed muon beam, a high-rate capable positron detector, two-dimensional and three-dimensional muon beam profile monitors, and a large-volume magnetic shield were orchestrated. In the pursuit of evaluation of the systematic uncertainty, a numerical simulation framework was developed. As a result of the experiment, the resonance of the hyperfine transition was successfully observed. Experimental data analysis and estimation of systematic uncertainty demonstrated the validity of the new methodology seeking a new frontier of the precision physics with the high-intensity pulsed muon beam.

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RIBF Hall, RIBF bldg., RIKEN

\* The talk will be given in English language.

Contact: Nuclear Physics Seminar Organizing Committee  
[npsoc@ribf.riken.jp](mailto:npsoc@ribf.riken.jp)  
<http://ribf.riken.jp/~seminar/>