国立研究開発法人理化学研究所　仁科加速器研究センター
第248回 RIBF核物理セミナー
RIKEN Nishina Center for Accelerator Based Science
The 248th RIBF Nuclear Physics Seminar

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

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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 discussed. 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. In order to resolve the problems in the precursor experiments, the world highest intensity pulsed muon beam, a high-rate capable positron detector, two-dimensional and three-dimensional muon beam profile monitors, and a high performance 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 hyperfine transition was successfully observed. Experimental data analysis and estimation of systematic uncertainty demonstrated validity of the new methodology seeking a new frontier of the precision physics with high-intensity pulsed muon beam.

＊ The talk will be given in English language..

Mar.6th(Tue.)2018　13:30～
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