Contribution ID: **42** Type: **not specified**

Toward the measurement of the hyperfine splitting in the ground state of muonic hydrogen

Wednesday, 17 September 2014 14:30 (20 minutes)

We report on the recent advances in the project to measure the hyperfine splitting in the ground state of the muonic hydrogen atom and determine the proton Zemach radius with improved accuracy – a project that is believed to face the proton size puzzle from an alternative point of view.
Progress has been made in each of the fields that were initially considered as stumbling blocks. The project for the development of a tunable mid-infrared laser source with characteristics appropriate for this spectroscopy application is near to completion. The verification of the experimental method based on studying the time distribution of muon transfer events to heavier elements and the energy dependence of the transfer rate, is in progress at RIKEN- RAL facility, where the pulsed muon source has a sufficient intensity. The efficiency of the method and the expected accuracy have been re-analyzed by means of Monte Carlo simulations.

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Session Classification: session II