Contribution ID: **193** Contribution code: **P-TUE-11** Type: **Poster**

Intense Lyman-alpha light source for ultra-slow muon generation

Tuesday, 30 August 2022 18:40 (20 minutes)

Reduction of the momentum width in the muon beam is required in particle physics and material science. A small-momentum-width muon beam so called ultra-slow muon beam can be realized by laser ionization of muonium which can be produced by stopping of surface muons in a solid target and thermally diffusing them. Such an ultra-slow muon generation technique reduces the momentum width to about 100 meV. The application of this ultra-slow muon beam to μSR measurement will enable to measuring of the physical properties from the surface to the interface of materials more clearly with extremely high depth resolution. In order to efficiently generate ultra-slow muons, two coherent lights are required: the so called Lyman-alpha light, which resonantly excites muonium from the ground state to 2p, and the 355 nm light, which ionizes excited muonium to the unbound state. In particular, the generation of intense Lyman-alpha coherent light for resonant excitation is a challenging task in laser technology because the wavelength of the Lyman-alpha light is in vacuum ultraviolet. At J-PARC MLF the Ultra-Slow Muon beamline, we have successfully generated muonium resonant Lyman-alpha coherent light exceeding 10 μJ using an all-solid-state laser and high-efficiency vacuum ultraviolet light generation technologies, and we have applied the Lyman-alpha light to the generation of ultra-slow muons. In this presentation, we will describe the current status of our intense Lyman-alpha light source, and future upgrade of the light source will be presented.

Primary author: Prof. OISHI, Yu (KEK/J-PARC)

Co-authors: Dr ADACHI, Taihei (RIKEN); Dr SAITO, Norihito (RIKEN); Dr IKEDO, Yutaka (KEK/J-PARC); Dr ISHIDA, Katsuhiko (RIKEN); Dr KANDA, Sohtaro (KEK/J-PARC); Mr UMEZAWA, Takuya (Ibaraki Univ.); Dr KAMIOKA, Shusei (KEK); Dr TESHIMA, Natsuki (KEK/J-PARC); Dr NAKAMURA, Jumpei (KEK/J-PARC); Prof. NAKAMURA, Shinki (Ibaraki Univ.); Prof. MIYAKE, Yasuhiro (KEK/J-PARC); Dr IWASAKI, Masahiko (RIKEN); Dr WADA, Satoshi (RIKEN); Prof. SHIMOMURA, Koichiro (KEK/J-PARC)

Presenter: Prof. OISHI, Yu (KEK/J-PARC)

Session Classification: Posters

Track Classification: New techniques