

## Muon Precision Measurements with a Penning Trap

Muon, which has a mass of about 200 times greater than that of an electron, is expected to be a good probe to search for new physics beyond the Standard Model. There is a  $4.2\sigma$  discrepancy between the theoretical value of the Standard Model and the experimental value observed from muon  $g - 2$  experiments [1, 2, 3]. At J-PARC, precision measurements of muon  $g - 2$  and muonium hyperfine structure are planned [4, 5]. In addition, by combining the ultra-slow muon technology at J-PARC with the Penning trap technology, we plan to measure the mass, lifetime, and magnetic moment of a rest muon with the precision of 1 ppb, 1 ppm, and 1 ppb, respectively. In this talk, we will present the conceptual design and progress of the muon Penning trap project.

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- [2] T. Albahri *et al.*, (Muon  $g-2$  Collaboration), Phys. Rev. D **103**, 072002
- [3] T. Albahri *et al.*, (The Muon  $g-2$  Collaboration) Phys. Rev. A **103**, 042208
- [4] M. Abe *et al.*, Prog. Theor. Exp. Phys. 2019, 053C02.
- [5] S. Kanda *et al.*, Phys. Lett. B **815** 136154.

### Working group

WG4

**Primary author:** NISHIMURA, Shoichiro (KEK)

**Co-authors:** SHIMOMURA, koichiro (KEK IMSS); ADACHI, Taihei (KEK IMSS); NIO, Makiko (RIKEN); HIGUCHI, Takashi (RCNP, Osaka University); NAGATANI, Yukinori (KEK IMSS); PANT, Amba (KEK IMSS); IINUMA, Hiromi (Japan/Ibaraki-University)

**Presenter:** NISHIMURA, Shoichiro (KEK)

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