

# Measurement of muonium hyperfine splitting at J-PARC

K. S. Tanaka<sup>1,3</sup>, M. Aoki<sup>4</sup>, H. Inuma<sup>2</sup>, Y. Ikedo<sup>2</sup>, K. Ishida<sup>3</sup>, M. Iwasaki<sup>3</sup>, K. Ueno<sup>2</sup>, Y. Ueno<sup>1</sup>, T. Okubo<sup>2</sup>, T. Ogitsu<sup>2</sup>, R. Kadono<sup>2</sup>, O. Kamigaito<sup>3</sup>, N. Kawamura<sup>2</sup>, D. Kawall<sup>8</sup>, S. Kanda<sup>2,6</sup>, K. Kubo<sup>7</sup>, A. Koda<sup>2</sup>, K. M. Kojima<sup>2</sup>, N. Saito<sup>2</sup>, N. Sakamoto<sup>3</sup>, K. Sasaki<sup>2</sup>, K. Shimomura<sup>2</sup>, M. Sugano<sup>2</sup>, M. Tajima<sup>1</sup>, D. Tomono<sup>9</sup>, A. Toyoda<sup>2</sup>, H. A. Torii<sup>1</sup>, E. Torikai<sup>5</sup>, K. Nagamine<sup>2</sup>, K. Nishiyama<sup>2</sup>, P. Strasser<sup>2</sup>, Y. Higashi<sup>1</sup>, T. Higuchi<sup>1</sup>, Y. Fukao<sup>2</sup>, Y. Fujiwara<sup>6</sup>, Y. Matsuda<sup>1</sup>, T. Mibe<sup>2</sup>, Y. Miyake<sup>2</sup>, T. Mizutani<sup>1</sup>, M. Yoshida<sup>2</sup>, and A. Yamamoto<sup>2</sup>

<sup>1</sup>Graduate School of Arts and Sciences, University of Tokyo; 3-8-1 Komaba, Meguro-ku, Tokyo 153-8902, Japan

<sup>2</sup>KEK; 1-1 Oho, Tsukuba, Ibaraki 305-0801, Japan

<sup>3</sup>RIKEN; 2-1 Hirosawa, Wako, Saitama 351-0198, Japan

<sup>4</sup>Osaka University; Toyonaka, Osaka 560-0043, Japan

<sup>5</sup>University of Yamanashi; Kofu, Yamanashi 400-8511, Japan

<sup>6</sup>Graduate School of Science, University of Tokyo; 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

<sup>7</sup>International Christian University (ICU); Mitaka, Tokyo 181-8585, Japan

<sup>8</sup>University of Massachusetts Amherst, USA

<sup>9</sup>Graduate School of Science, Kyoto University; Sakyo-ku, Kyoto 606-8501, Japan

Presenting Author: tanaka@kaduo.jp

We are planning a measurement of the ground state hyperfine structure of muonium at J-PARC/MLF. Muonium is a hydrogen-like bound state only consist of leptons, and its HFS is a good probe for testing QED theory. Fundamental constants of muon such as mass and magnetic moment have been so far determined by the muonium HFS experiment at LAMPF[1]. The high intensity beam (H-line)[2] soon to be available at J-PARC allows one order of magnitude more accurate determination of those constants, which also plays an important role in the new measurement of anomalous magnet moment of muons. Muonium atoms are formed by electron capture reaction with Krypton gas and their spin are flipped by microwave magnetic field (Figure. 1). Furthermore, we are planning a measurement of its HFS at zero-field as a trial of the setup end of this year. In this contribution, we present the progress of preparations for this measurement.

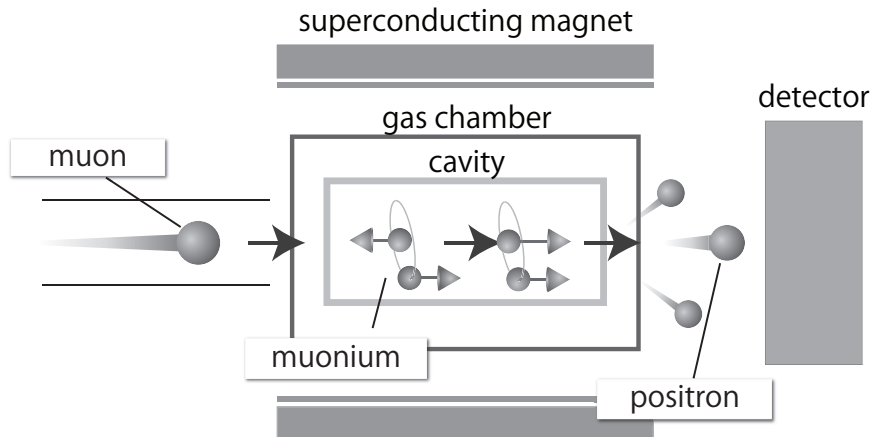


Figure 1: Setup of this experiment

## References

[1] W. Liu et al., Phys. Rev. Lett., 82,711 (1999)

[2] N. Kawamura et al., JPS Conf. Proc. 2, 010112 (2014)