International Conference on Exotic Atoms and Related Topics and conference on Low Energy Antiprotons (EXA/LEAP 2024)



Contribution ID: 128

Type: not specified

Positron polarimetry with resonant microwave radiation

Thursday 29 August 2024 14:00 (25 minutes)

Spin polarized positron beams are employed in investigations of magnetic and electronic structure dynamics [1, 2] and may also be useful in the production of a positronium Bose-Einstein condensate [3]. Slow positron beams derived from radioactive sources are naturally spin polarized due to the non-conservation of parity in the beta decay process [4] although measuring the polarization can be challenging. Existing polarimetry techniques involve either strong magnetic field (~ 1 T) [5], high density beams (1016 cm-3) [6] or high beam energies (100 keV) [7]. Since the polarisation is conserved in positronium formation, a technique involving depletion of magnetic sub-levels of triplet positronium via irradiation by microwaves may be more desirable. In this work we describe such an approach where the spin polarisation of a positronium beam [8] using circularly polarised microwave radiation. We present the experimental method and recent progress of the investigation.

- 1] Gidley et al., Phys. Rev. Lett. 49 1779 (1982)
- [2] M. Maekawa et al., Phys. Rev. Lett. 126 186401 (2021)
- [3] P. M. Platzmann and A. P. Mills, Jr., Phys. Rev. B 49 454 (1994)
- [4] C. S. Wu et al., Phys. Rev. 105 1413 (1957)
- [5] Y. Nagai et al., Nucl. Instrum. Methods Phys. Res. B 171 199 (2000)
- [6] D. B. Cassidy et al., Phys. Rev. Lett. 104 173401 (2010)
- [7] J. C. Hopkins et al., Phys. Rev. 121 1185 (1961)
- [8] D. M. Newson et al. Rev. Sci. Instrum. 94 083201 (2023)

Authors: CASSIDY, David B; NEWSON, Donovan

Presenter: NEWSON, Donovan

Session Classification: Parallel I