Contribution ID: **79** Type: **Poster**

# Characterisation of an energetic beam of metastable positronium atoms for precision spectroscopy

*Monday 10 June 2024 18:00 (2 hours)*

Precision measurement of positronium, the bound-state of an electron and a positron, can be used to probe fundamental theories and place constraints on physics beyond the standard model [1]. Previous spectroscopic studies [2, 3] of the n=2 fine-structure intervals using slow-moving clouds of positronium have achieved only mediocre precision compared with studies of simple atomic systems (e.g. [4]), primarily due to line shape distortions [2] caused by microwave reflections [5], and frequency-dependent power variations over the 50 MHz natural line width of the 2S-2P transition. Techniques involving separated fields (e.g. [6]) may offer a way forward, although a beam of fast moving atoms in the metastable-state are required [7]. In this work I describe the characterisation of an energetic beam of $2^3S_1$ positronium atoms[8], towards precision measurement of the positronium n=2 fine-structure. Results of initial spectroscopic studies and recent progress are presented.

[1] G. S. Adkins et al. Phys. Rep. **975**, 1 (2022)
[2] L. Gurung et al. Phys. Rev. A **103**, 042805 (2021)
[3] R. E. Sheldon et al. Phys. Rev. Lett. **131**, 043001 (2023)
[4] R. G. Bullis et al. Phys. Rev. Lett. **130**, 203001 (2023)
[5] R. E. Sheldon et al. Phys. Rev. A **107**, 042810 (2023)
[6] A. C. Vutha and E. A. Hessels Phys. Rev. A **92**, 052504 (2015)
[7] T. J. Babij and D. B. Cassidy, Eur. Phys. J. D **76**, 121 (2022)
[8] D. M. Newson et al. Rev. Sci. Instrum. **94**, 083201 (2023)

**Author:** NEWSON, Donovan

**Presenter:** NEWSON, Donovan

**Session Classification:** Poster Session 1