Contribution ID: **73** Type: **Poster**

Towards observing anti-hydrogen fluorescence: Investigation of SiPMs in cryogenic environments

Tuesday, 28 June 2022 16:36 (2 minutes)

The 1S-2P transition has been measured to a precision of 5×10^{-8} in 2018 by the ALPHA collaboration[1]. This milestone was achieved by allowing a trappable 2P state to decay to a non-trappable 1S state causing it to annihilate with the inner wall of the trapping apparatus. The annihilation events were destructively measured using a silicon vertex detector. The next generation ALPHA-3 apparatus will be equipped with silicon photomultipliers (SiPM) in order to detect fluorescent light from antihydrogen atoms down to the single photon level. Detecting fluorescent light from anti-hydrogen offers the possibility to probe the inner structure of the anti-atom *in situ* and *non destructive* such that more precise spectroscopic measurements could be done. Furthermore, the use of SiPMs would be a great tool for the diagnostics of beryllium ion plasmas which will be used to sympathetically cool down positrons in order to obtain colder anti-hydrogen. There are however several engineering challenges to overcome: the SiPMs need to be tested in a similar environment as the trapping apparatus which operates at temperatures down to 4 K where limited space is available for the SiPMs to be installed. We will present methods to characterise the SiPMs in a cryogenic environment and feasibility studies of the use of SiPMs inside the ALPHA apparatus.

[1] M. Ahmadi et. al, (2018), Observation of the 1S–2P Lyman-αtransition in antihydrogen, *Nature, vol. 561, pp. 211-215*

Primary author: SCHOONWATER, Joos Danjeel (Eindhoven Technical University (NL))

Co-author: Dr CRIDLAND, April Louise (Swansea University)

Presenter: SCHOONWATER, Joos Danjeel (Eindhoven Technical University (NL))

Session Classification: Posters