HK 50: Poster – Fundamentale Symmetrien

Zeit: Donnerstag 14:00–16:00 Raum: P Foyer

HK 50.1 Do 14:00 P Foyer

Experimental setup for photodetachment studies of the negative positronium ion† — •Stefan Gärtner[1], Hubert Ceeh[2], Christoph Hugenschmidt[2], Klaus Schreckenbach[2], Dirk Schwalm[3], and Peter Thirolf[1] — [1]LMU München, Garching — [2]TU München and FRM II, Garching — [3]MPI für Kernphysik, Heidelberg and Weizmann Institute, Rehovot, Israel

After the recent successful high-precision measurement of the Ps^- ion ($e^+e^-e^-$) decay rate by our group ($\Gamma = 2.0875(50)\,ns^{-1}$ [1]), an experimental setup has been devised for photodetachment studies of this fundamental three-body system at the NEPOMUC high-flux positron source at the FRM II reactor in Garching. Theoretical calculations for the photodetachment cross section [2] will be tested in the off-resonant regime at the two wavelengths (532 nm and 1064 nm) provided by a high-power, high-repetition Nd:YAG laser (100 W average power, 10 kHz repetition rate). The principal feasibility has been shown in [3] using a reflection geometry. By employing a transmission geometry, we aim at a quantitative result and in a later stage at the production of an energy-variable pure ortho-positronium beam, which then can drive further experiments, e. g. spectroscopy of the $1^3S_1 \rightarrow 2^3S_1$ transition in positronium. First experimental results are expected mid of 2012, when the NEPOMUC upgrade to yield an intensity significantly higher than the current $\approx 9 \cdot 10^8$ moderated e^+/s will be completed.

[1] H. Ceeh *et al.*, Phys. Rev. A **84**, 062508 (2011). [2] A. Igarashi *et al.*, New J. Phys. **2**, 17 (2000). [3] K. Michishio *et al.*, Phys. Rev. Lett. **106**, 153401 (2011). †Supported by DFG under contract HA1101/13-1.

HK 50.2 Do 14:00 P Foyer

A Kelvin Probe set-up to measure the work function for *a*SPECT — •Christian Schmidt for the aSPECT-Collaboration — Institut für Physik, Johannes Gutenberg-Universität Mainz

*a*SPECT is a high precision experiment testing and looking for physics beyond the standard model. It utilizes a retardation spectrometer of MAC-E type to measure the proton recoil spectrum in free neutron decay in order to determine the electron antineutrino angular correlation coefficient a. Currently a is determined with a precision of $\frac{\Delta a}{a} \approx 5\%$, whereas *a*SPECT aims for a precision of $\frac{\Delta a}{a} \approx 0.3\%$. For *a*SPECT the potential difference between the decay volume and the retardation electrode has to be known better than 10 mV. The same limit have to be fulfilled for the spatial fluctuations of the potential. The electrode system used for *a*SPECT is made of gold-coated copper. The work function of gold surfaces exhibits fluctuations at a level of 100-200 mV. These fluctuations must be quantified, understood and minimised. Therefore we have set up a Scanning Kelvin Probe System. This Kelvin Probe set-up will also be used to measure the work function of other precision experiments like KATRIN. This poster will present the first measurements and results.