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TECHNISCHE
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Master thesis in Experimental Nuclear Physics

Positron accumulation for the GBAR experiment at CERN

A Master thesis project is proposed at the Institute of Nuclear Physics (IKP) of TU Darmstadt.

Project description:

GBAR is a CERN experiment aiming at measuring the behaviour of antimatter (antihydrogen atoms) in the gravitational field of the earth. A key component of the experiment is the production of \bar{H}^+ ions (two positrons bound to an antiproton), the first step towards the production of H at rest. At GBAR, the formation of \bar{H}^+ ions is made by sending bunches of slow (3 keV) antiprotons through a dense cloud of positronium, a short lived binary system composed of an electron and a positron. The density of positronium drives the production rate of \bar{H}^+ for the measurement.

The Master project focuses on the accumulation of the positrons and its optimisation, necessary to the production of positronium. The Master thesis will take place mainly at CERN at the GBAR experiment. The candidate will learn about positron trapping, and will optimise the production of positrons with the objective of accumulating $1e10$. The optimisation of the transfer of positrons to the reaction chamber will be part of the thesis. The candidate will take part to the \bar{H}^+ production run at GBAR in 2022.

Candidate profile:

Only candidates holding a Bachelor degree in physics or engineering may apply.

Interested candidates should contact Prof. Alexandre Obertelli, alexandre.obertelli@tu-darmstadt.de and Dr. Samuel Niang, samuel.niang@cern.ch.
