

## Master work in applied nuclear physics

### “Setting up a trap experiment for g-factor measurements”

*Engineering Programme / Master in Physics - Degree Project (Ex-jobb)*

*Applied Nuclear Physics 30 credits (20 weeks)*

HITRAP is a unique facility for high precision experiments with cold highly-charged ions (HCI) of heavy elements currently being constructed at the research facility GSI in Germany. Later HITRAP will become an integrated part of the new international accelerator facility FAIR, one of the largest research projects worldwide.

At HITRAP HCI of all elements and charge states, up to  $U^{92+}$ , can be delivered by the accelerator complex. These will be decelerated and captured in a Cooling Penning trap and, after cooling to sub-meV energy, the ions will be extracted to the experimental area. One of the first experiments to be constructed is the ARTEMIS Penning trap for measurement of the g-factor of heavy hydrogen like systems like  $U^{91+}$ . This measurement will serve as a benchmark of theoretical predictions for g-factors calculated in the framework of bound state quantum electrodynamics (QED). The measurement of the atomic  $g_F$  factors of two hyperfine structure levels on the ppb level of accuracy will allow the extraction of nuclear magnetic moments without diamagnetic corrections as well as the quantification of diamagnetic shielding effects.

We are constantly looking for students who want to spend time at the research facility working with the development of the setup. There are currently many sub-task that can easily be transformed into suitable diploma works.

#### **Start date**

Upon agreement

#### **Contact**

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