Calculation of atomic and nuclear parameters for increasing the accuracy of nuclear magnetic moment determination.

High accuracy nuclear data is important for both basic research and industrial applications. With the development of accelerators and novel methods, it is today possible to study short-lived isotopes. One of the properties of interest to measure is the nuclear magnetic moment. The traditional method used (NMR nuclear magnetic resonance) is not applicable, why one must use indirect methods by using atomic properties (hyperfine structure, a magnetic interaction between electrons and the nucleus) determined by laser spectroscopy. However, in order to do this with higher accuracy there are a number of corrections and extensive analysis that must be done. The aim of this project is to calculate these corrections and compare with alternative methods.

The project is part of an international collaboration. (https://www-nds.iaea.org/publications/indc/indc-nds-0732.pdf)

Papers based on Master-projects in this project:
Calculation of the Differential Breit–Rosenthal Effect in the 6s6p 3P1,2 States of Hg Atoms 2020, 8(4), 86; https://doi.org/10.3390/atoms8040086

CALCULATION OF THE DIFFERENTIAL BREIT-ROSENTHAL EFFECT IN Pb, Atoms 12(1), 5 (2024) https://doi.org/10.3390/atoms12010005

CALCULATION OF THE DIFFERENTIAL BREIT-ROSENTHAL EFFECT IN Bi I, Atoms 12(12), 72 (2024) https://doi.org/10.3390/atoms12120072

Recommended courses at NTNU for this project:

TFY4210 - Kvanteteori for mangepartikkelsystemer
TFY4225 - Kjerne- og strålingsfysikk

Online course from Ghent. https://www.hyperfinecourse.org/

Master thesis (30 or 60 ECTS)
It is recommended to do a project first to get to know the code used, if the calculations will be done.

Supervisor: Jonas Persson, jonas.persson@ntnu.no