Internship in experimental nuclear physics

Analysis of the D correlation measurement for 23Mg+ decay

The MORA project gathers experts of ion manipulation in traps and laser orientation methods for searches of New Physics (NP) in nuclear beta decay, looking for possible hints to explain the matter-antimatter asymmetry observed in the Universe. The precise measurement of the so-called triple *D* correlation is sensitive to Time reversal violation, and via the CPT theorem, to CP violation. As such, the measurement of *D* in nuclear beta decay is a complementary probe to the electric dipole moment of the neutron. It is particularly sensitive to the existence of Leptoquarks, which are hypothetical gauge bosons appearing in the first theories of baryogenesis, and numerous theories beyond the Standard Model.The symmetries of the MORA detection system and the well-controlled parameters of the trapped and polarized ion cloud permit to aim at a final sensitivity of a few 10-5 on *D*. Such a sensitivity is about one order of magnitude better than present limits on *D*, from measurements in neutron and 19Ne decay.
The first experiment for the polarization degree (proof of principle) and D correlation will be performed for the decay of 23Mg+ ions with a half-life of 11.3s by February 2022 at JYFL, Finland. The master student will take part in the data analysis of the first experiment.

Expected skills
Experimental physics, good communication skills, Programming C++/python

This work can be pursued by a PhD-thesis

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