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Detection of the decay of laser oriented trapped radioactive isotopes for the MORA Project

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The MORA (Matter's origin from the Radioactivity of trapped and oriented ions) project focuses on the measurement of D correlation parameter in the nuclear beta decay of trapped and oriented ions. The D correlation offers the possibility to search for new CP-violating interactions at much higher level than predicted by the standard model.

Technically, MORA utilizes an innovative in-trap orientation method combining the high trapping efficiency of a Paul trap with laser orientation techniques by exposing the confined ion cloud to circularly polarized laser light. Currently, the trapping, detection and laser setups are under development.

The MORA setup dedicated for the trapping is inspired from the Paul trap of the LPCTrap experiment which has a trapping capacity of $5 \cdot 10^5$ ions along with trapping lifetime limited so far to 0.5 s. With an optimized geometry and RF system, we expect the trap of MORA should enable cycle times of the order of a few s.

This project will first focus on the proof-of-principle of the in-trap laser orientation technique and then on the measurement of D correlation in the decay of $^{23}\text{Mg}^+$ ions at JYFL(Finland) and in GANIL(Caen). In my talk, I would be briefly discussing the motivation and related physics.

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