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The MOLLER and P2 Experiments; High precision tests of the running of the Weak mixing angle

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The so called Standard Model is a phenomenological model, in the sense that it relies on experimental input and has been continuously refined, based on that input, for the better part of a century. It is generally accepted that the Standard Model is incomplete,for various reasons.

The Standard Model is a gauge theory, which produces floating parameters, called couplings, or "charges", for which the values can only be determined through measurement and that set the strength of a particular type of interaction (e.g. the Weak interaction). The MOLLER (Jefferson Lab) and P2 (Mainz MESA facility) experiments, are fully funded and currently in the development and construction phase. They aim to measure the so called "Weak-charge" of the electron and proton respectively to the highest precision yet. MOLLER and P2 exploit the fact that the Weak interaction violates parity (has a preferred handedness), which means it has the potential to uncover new, parity violating, interactions for electrons and protons (among other new physics sensitivities). The two measurements are complementary since they couple to potential new physics in different ways. I will explain the motivation for the experiments and give an overview of the design and the technologies it will use.

Scientific topic

Symmetries and Interactions

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