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Testing the Pauli Exclusion Principle for electrons with the VIP-2 experiment

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The VIP2 experiment is a major upgrade of the VIP (Violation of the Pauli exclusion principle) experiment and is testing the Pauli Exclusion Principle (PEP) for electrons, looking for a possible forbidden transition energy which could point out a violation of PEP.
The transition energy monitored in VIP and VIP2 is that of the Kα1 line of the copper atom, which is 8047.8 eV. The transition energy forbidden by PEP is 7747 eV, as calculated using the Multi Configuration Dirac-Fock and General Matrix Element (MCDFGME) program.
The VIP experiment, which tooke place at National Laboratory of Gran Sasso (LNGS) of the National Institute of Nuclear Physic (INFN) from 2006 to 2010, set a new upper limit to the violation of PEP for electrons which is 4.7 x 10^(-29).
In this talk I shall review the latest activities within the VIP2 collaboration and I shall explain theoretical reasons of this important test for the PEP.
I shall speak about the installation of the upgraded setup at LNGS, highlighting the significative improvements performed on the apparatus and based on which we have set the goal that VIP2 should be able to achieve. I shall show the preliminary results obtained with the new setup of VIP2 using the data collected until 2018 and present the random walk model which describes the electron path inside the copper target, wand gives the possibility of setting a further smaller upper limit.
Future perspectives will be illustated, including a possible experiment using germanium detectors. Finally I shall comment on the data analysis procedure and as well on the theoretical activities for the interpretation of the results in the framework of theories beyond the Standard Model.

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