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Report on GEMMA project

The GEMMA-III project based on low threshold germanium detectors is dedicated to the study of neutrino properties. This project aims to measure the magnetic moment of the neutrino with a sensitivity of $9 \times 10^{-12} \mu_B$ in several years of data improving the present limit by at least one order of magnitude. The existence of a magnetic moment for the neutrino could allow determining the nature of the neutrino if the value is greater than $10^{-12} \mu_B$. The germanium detector technique will be also used to try to observe the coherent scattering of the neutrino at low energy thanks to the low threshold and low background in the ν GEN experiment.

Since several years, JINR perform experiments near the Kalinin Nuclear Power Plat. This commercial reactor has the advantage to provide a large flux of neutrinos and the experiments can be placed at a distance of 10 m from the core. This exceptional condition allows looking for rare neutrino processes.

GEMMA-III is an evolution of the program started with GEMMAI-I which has given the best direct limit on the neutrino magnetic moment $m < 2.9 \times 10^{-11} \mu_B$. New detectors of about 1 kg will be used (instead of 400 g) with an improvement of the background. The energy threshold will be lower than 400 eV with a resolution of 80 eV.

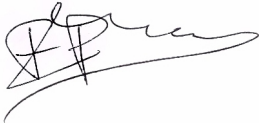
The background conditions are also improved by moving the experiment in a new place with higher overburden against cosmic rays. The experimental setup is designed to have the capability to move the platform hosting the detectors in order to change the distance from the reactor and then to have some background cancellation.

GEMMA-III will be the most sensitive experiment looking for magnetic moment of neutrino if the background expectations are fulfilled.

In parallel, JINR develops also new point-like contact detector to try to observe the coherent scattering at low energy. A precise measurement of the cross-section will permit to look for any deviation from Standard Model which would be the sign of new physics. New 400 g detectors have been produced and tested in low background conditions at Modane Underground Laboratory. The test have shown that the required background has been reached $1 \text{ cts}/(\text{keV} \times \text{kg} \times \text{day})^{-1}$ as well as the energy threshold (350 eV). It is expected to collect few tens of events per day corresponding to coherent scattering interactions.

The JINR neutrino program at KNPP is undoubtedly of high quality with world leading experiments for the search of neutrino magnetic moment and neutrino coherent scattering at low energy.

In conclusion I strongly recommend to support the GEMMA-III project.



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