LABORATOIRE SOUTERRAIN DE MODANE
http://www.lsm.fr
Carré Sciences
1125 route de Bardonnèche
73500 MODANE
Tel. +33 4 79 05 22 57
Fax. +33 4 79 05 24 74

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Report on Edelweiss project

The EDELWEISS experiment is looking for direct dark matter (DM) detection of Weakly Interacting Massive Particles (WIMP). This is presently one of the most important questions in particle physics. EDELWEISS experiment is on going since 15 years with three phases. At the beginning, EDELWEISS was focused on the search of WIMPS of several tens of GeV and reached in 2010 the best sensitivity for the spin-independent WIMP-nucleon cross-section. Nowadays, cryogenic detectors like EDELWEISS are very suitable to look for low mass WIMP thanks to their low threshold and energy resolution and the collaboration decided to explore the low mass region (<10 GeV/c^2).This is motivated by the non-observation of supersymetry at LHC up to now and the development of new theoretical models compatible with low mass WIMP.

EDELWEISS is based on cryogenic Germanium detectors operating at 18 mK recording the heat and the ionisation coming from nuclear recoil in case of elastic scattering with a WIMP. An advantage of this technique is very good discrimination between electron recoil and neutron recoil. The main background are the neutrons coming from natural radioactivity, (alpha,n) reactions or muons spallation. The experiment is based in Modane Udergound Laboratory in France.

The project has been recently redirected in order to develop detector sensitive to low mass WIMP. The collaboration has developed 34 new detectors with large mass (800 g) and with a rejection system of surface events coming from alpha decays. Recently, the EDELWEISS-III experiment has published results for low mass search and reach a sensitivity of 1.6 10^{-39} cm^{-2} for the spin-independent WIMP-nucleon cross-section allowing to reject region covered by CoGeNT experiment.

An R&D is on going to improve the energy resolution for both heat and ionisation signals to reach a value of 100 eV. New type of transistors (High Electron Mobility Transistors (HEMT) instead of Junction Field Effect Transistors (JFET) will be used for the ionisation signal and new thermal sensors for the heat.

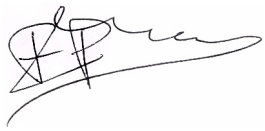
The next step is to produce new detectors, to improve the cryostat and to reduce backgrounds for the fourth EDELWEISS phase called EDELWEISS-LT with the ambition to reach a sensitivity of 10^{-43} cm^{-2} for the spin-independent WIMP-nucleon cross-section for a WIMP mass of few Gev/c^2 for 50 000 kg.d of data. The data taking is expected in 2020-2021.

The JINR team contributes on several aspects of the experiment: development of new detectors, Monte-carlo simulations, data analysis, assembly and commissioning of the detector, low

background studies, material screening, measurement of neutron flux and radon activity in the air near the detector.

EDELWEISS is a world leading experiment for the search of low mass WIMP. The JINR Dubna has already a strong involvement in this experiment since several years with essential and visible contributions.

In conclusion, I strongly recommend to support the EDELWEISS project.



Fabrice Piquemal
Director of Modane Underground Laboratory