Contribution ID : **682** Type : **Oral talk**

New mK-temperature Germanium detectors for Dark Matter direct search and for precision measurements of CEvNS

Friday, 9 October 2020 14:00 (30)

In direct searches for Dark Matter (DM) a technology developing by EDELWEISS experiment is arrays of Ge mono-crystal detectors operated at a temperature of few mK and equipped with electrodes and thermal sensors. Applying a small (few V/cm) external field, a simultaneous measurement of ionization and heat signals allows efficient identification of nuclear and electron recoils. A larger bias leads to a so-called Neganov-Trofimov-Luke internal amplification of the phonon signal, lowering the effective threshold and thus opening a search at the low energy region not accessible by huge Ar/Xe base detectors.

In 2020 an unprecedented charge resolution of 0.53 electron-hole pairs (RMS) has been achieved using the Neganov-Trofimov-Luke internal amplification in the EDELWEISS experiment operated at the LSM deep underground site (France). Thanks to this, the first Ge-based constraints on sub-MeV DM particles interacting with electrons, as well as on dark photons down to 1 eV have been set. These results demonstrated the high relevance of cryogenic Ge detectors for the search of DM interactions producing eV-scale signals. The region of "light WIMPs" will be further investigated in the EDELWEISS experiment thanks to advantage of energy resolution below 20 eV reachable with new array of HPGe bolometers. This stage is in the R&D phase, building of improved detectors, their holders and supports, improvement of the background and acquisition.

The unlimited target of current R&D and measurements in the EDELWEISS experiment is achievement of sensitivity allowing detection of B-8 solar neutrinos through coherent elastic neutrino-nucleus scattering (CEvNS). The same technology and detectors will be applied for precision measurements of CEvNS in the region of full coherency in the Ricochet experiment (reactor neutrinos). Due to direct energy reconstruction (heat signal) the main uncertainty arising due to not well known quenching in germanium will be avoided. 1 kg of new cryogenic detectors (developing thanks to joint R&D of EDELWEISS and Ricochet teams) will be integrated in the Ricochet cryostat. The Ricochet is going to be deployed at ILL (Grenoble, France) site, on a distance at about 8 m from the 58MW nuclear reactor, with first results expected to 2025. In addition to the main goal: precise (1% level) study of CEvNS the experiment will target NMM and other New physics phenomena. Possibility of further phases of the experiment at a Nuclear power plant (a 3.1GW reactor) at Russia is investigated.

Primary author(s) : YAKUSHEV, Evgeny (JINR, Dubna)

Presenter(s) : YAKUSHEV, Evgeny (JINR, Dubna)

Session Classification : Plenary

Track Classification : Nuclear physics