Contribution ID: **129** Type: **not specified**

Direct low-mass WIMP searches with HPGe Semiconductor Bolometers

S. Rozov on behalf of the EDELWEISS collaboration

The talk will be devoted to the EDELWEISS program searches for direct evidence of Dark Matter WIMPs from the Milky Way galaxy through their scattering off Ge nuclei within cryogenic Ge crystals.
Due to the extremely low event rates expected the main limitations of the experiment arise from the background radioactivity. Thus the experiment is set at the LSM underground laboratory (France) and using the mountain as a natural shielding of 4850 meters of water equivalent that reduces the muon flux down to about 5 μ/m2/day. In the current phase of the experiment novel 800-grams Fully Inter-Digitized detectors were commissioned and used. EDELWEISS detectors have an excellent background rejection performance, the best in the world, but not competitive with large Ar/Xe detectors in sensitivity to searches of WIMPs with masses above 6 GeV. Thus, the experimental program is moving to EDELWEISS-LT phase, with aims of investigation of “light WIMPs”, Axion Like Particles, etc in the energy region inaccessible by Ar/Xe. The region of “light WIMPs” could be thoroughly investigated in the EDELWEISS experiment thanks to advantage of energy resolution below 100 eV reachable with HPGe bolometers via the Neganov-Luke effect of internal amplification of the heat signal. First results obtained during the R&D phase are very promising. With excellent energy resolution achieved first sub-GeV limit with Ge, down to 500 MeV, will be presented.

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