Contribution ID : **60** Type : **Plenary/section talk**

TWO-PHASE EMISSION NOBLE GAS DETECTORS TO SEARCH FOR RARE EVENTS WITH LOW ENERGY DEPOSITIONS

Monday, 10 October 2016 15:45 (15)

This is a review of a technology of two-phase emission detectors using liquid noble gases as working media. This kind of detectors invented at MEPhI almost 50 years ago is extremely sensitive to ionization (down to single electrons) and can be very massive (in ton scale) in order to provide high count rate for quite rare events and organize an active shielding from natural radioactivity in a wall-les configuration of readout system. The emission detectors found their unique application in the most sensitive at the moment experiments searching for cold dark matter in the form of weakly interacting massive particles (WIMPs). The last results of this search are reviewed in this paper. The current best limits for the spin-independent interaction of supersymmetric WIMPs having a mass in the range between 5 and 1000 GeV/c2 with nucleons were measured with PANDAX-II detector containing 500 kg of liquid xenon. Emission detectors of the next generation G2, such as LZ with an active detector mass of 7 tons, will either unambiguously detect WIMPs or rule out all current theoretical predictions for WIMP existence. Detectors of the G3 generation of up to 20 ton will be used for multiple purposes including detection of double beta neutrinoless decay and low-energy neutrinos using effect of elastic coherent scattering off nuclei. This process is allowed in the Standard Model and was predicted almost 50 years ago, but so far has not been observed. This process plays an important role in the formation of the Universe and the evolution of stars and can be a sensitive probe of New Physics beyond the Standard Model. Experimental observation of the effect is very difficult because of the extremely low energy deposition in a massive detector medium. The review includes a description of the RED-100 two-phase liquid xenon emission detector especially constructed to detect the elastic coherent neutrino scattering off xenon nuclei when the detector is installed practically on the Earth's surface.

Primary author(s) : Prof. BOLOZDYNYA, Alexander (NRNU MEPhI)

Presenter(s) : Prof. BOLOZDYNYA, Alexander (NRNU MEPhI)

Session Classification : Methods of experimental physics - parallel I

Track Classification : Methods of experimental physics