Contribution ID : **855** Type : **Poster**

Processing liquid xenon working medium of the RED-100 detector for setting up an experiment to observe the elastic coherent scattering of nuclear reactor neutrinos off xenon nuclei

Monday, 5 October 2020 17:30 (150)

The RED-100 detector is built to search for elastic coherent scattering electron antineutrino off xenon nuclei in forecoming experiment at the Kalinin NPP. The expected useful signals consist of a few electrons in 200 kg of liquid xenon medium. A new multi-stage technology is developed and tested at NRNU MEPhI for processing liquid xenon working medium in order to achieve more than 10 ms quasi-free electron lifetime before capture by electronegative impurities.

The processing consists of a few stages. In the first stage, liquid xenon is irradiated by the hard ultraviolet radiation generated by an electric high-voltage discharge in a liquid, for the purpose of decomposition of complex high-molecular impurities due to photolysis. At the second stage, a massive sample of liquid xenon is purified with nanodispersed titanium getter generated in the liquid by a high-voltage electric discharge between the titanium electrodes. At the third stage, which can run parallel to the first and second stages in time, the internal surfaces of the detector and gas communication lines are cleaned by repeatedly circulating the gaseous xenon through a hot metal getter in a closed loop. At the fourth stage, already during the operation of the detector, the liquid xenon is withdrawed from the filled detector, evaporated in a special heat exchanger, goes through the hot metal getter, and condensates into the detector by means of a heat exchanger. This stage is carried out simultaneously with a physical experiment and assumes a continuous measurement of the lifetime of electrons before capture by electronegative impurities to correct the experimental data obtained.

The developed multi-step technology has been demonstrated to be an effective method for obtaining necessary (satisfying highest experimental requirements) purity of raw xenon material contaminated during a previous isotope modification process.

Primary author(s) : SHAKIROV, Aleksey (MEPhI)

Presenter(s) : SHAKIROV, Aleksey (MEPhI)

Session Classification : Poster session

Track Classification : Facilities and advanced detector technologies