

Report on SuperNEMO project

1 Goal of the experiment

SuperNEMO is looking for the neutrinoless double beta decay to test the nature of the neutrino (Majorana or Dirac). The knowledge of this property is essential for cosmology and particle physics.

In the global competition, SuperNEMO is the only tracking experiment able to measure all kinematics parameters allowing to distinguish the process leading to neutrinoless double beta decay in case of signal. The collaboration is building a demonstrator module accommodating 7 kg of isotope to demonstrate the faisability for 100 kg experiment to explore inverted hierarchy neutrino mass. The detector can measure several double beta decay isotope at the same time.

The detector allows also precision measurement in two-neutrino double beta decay to look for exotic processes.

2, Contributions of the JINR Group

The JINR team has strong contribution on the hardware of SuperNEMO with successful R&D on the calorimetric modules (plastic scintillator coupled to photomultipliers) to reach 4% at 3 MeV. JINR provides 720 plastic scintillators (16l), 100 8" PMT, 1.5 kg of enriched ^{82}Se .

The JINR team has developed an original chemical method to purify the enriched Selenium sources; this method is universal and can be used for other isotopes.

The JINR team has also provided detectors for low background gamma and alpha spectroscopy for material screening for the SuperNEMO detector, and radon measurement at Modane Underground Laboratory.

JINR Dubna is involved in IB of the collaboration.

3 Plan

The detector is under commissioning and will take data beginning 2019. The data taking is expected to be 2.5 years to reach a sensitivity of 0.2-0.4 eV on effective neutrino mass. The involvement on the analysis is not detailed

4 Publications

8 publications on NEMO-3 and SuperNEMO with strong JINR contribution . JINR plays a leading role in the NEMO-3 analysis and results of JINR team are consider has the reference for most of the articles.

5 PhD theses

1 PhD in 2018

1 PhD will be defended in 2019.

6 Talks

1 talk at neutrino 2018

7 Group size, composition and budget

17 staff members. The team is composed of physicists and chemists. The chemist team has young people which is not the case of the physics team

Comments

The JINR team is involved since 25 years in the NEMO collaboration. It has crucial contribution in The NEMO3 and SuperNEMO experiment in various part of the detector with important investments. The contributions are very visible. JINR team is the leading group in NEMO3 analysis.

The expertise of the team is very high in the field of low background technics. It provided very high sensitivity detector to select SuperNEMO material by alpha and gamma-ray spectroscopy.

The expertise on radio-chemistry has been essential to reach the required level of radiopurity for the Se double beta decay source thank to a new versatile method.

The team size was adapted for all the development and construction for SuperNEMO.

The JINR should take care to have the same impact on the SuperNEMO analysis that NEMO-3. The involvement of young people in the analysis would be surely welcome in order that JINR have a contribution on the analysis at the level of the hardware development and investment.