

PARTICLE PHYSICS AT PIK REACTOR COMPLEX

Addendum to the Comprehensive overview for the EPPSU-strategy

- Interested community: carry out various fundamental researches on the high-flux reactor PIK using cold and ultracold neutrons common with the European community.
 - UCN project: high intensity ultracold neutron source based on superfluid helium (HeII) for various fundamental researches with UCN, including neutron EDM search.
 - Neutrino-4 project: Neutrino laboratory with liquid scintillator detectors with high gadolinium concentration (0.5%) on moveable platform to search for sterile neutrino.
 - Crystal-diffraction EDM project: Crystal-diffraction station with 3D polarization analysis system for various fundamental researches with cold neutrons.
 - PITRAP project: the involvement of European groups in the construction of the ion trap system is essential in the implementation of the PITRAP project.
 - NNbar project: experiment on search for neutron-antineutron oscillations by method of storing of ultracold neutrons in a material trap.
- The most attractive are collaborations with:
 - UCN project: Institut Laue-Langevin (France, Grenoble).
 - Neutrino-4 project: Joint Institute for Nuclear Research (Russia, Dubna), NEOS collaboration (Republic of Korea).
 - Crystal-diffraction EDM project: Institut Laue-Langevin (France, Grenoble, Prof. V. Nesvizhevsky), European Social Survey (ESS) with spallation neutron source for development a storage variant project;
 - PITRAP project: PENTATRAP laboratories in M. Planck institute for Nuclear Physics (Heidelberg), Helmholtz centrum GSI (Darmstadt) and BRD (Mainz), Accelerator laboratory (University of Jyväskylä, Finland), ISOLTRAP team of the ISOLDE at the CERN.
 - Project of NNbar experiment at cold neutron beam at European Spallation Source.
- Timeline: At the end of 2018 the program of reactor PIK commissioning is started. The full power is going to reach in 2-3 years.
 - UCN project: Ultracold neutron source to put inside WWR-M reactor is developed.
 - Neutrino-4 project: Neutrino detectors project is developed; moveable platforms are made; active shielding is preparing at IHEP (Protvino, Russia) with JINR support. Waiting for funding to get photomultipliers for the detectors.
 - Crystal-diffraction EDM project: calculations and design documentation are made for construction of superconducting system of 3D analysis of polarization is developed. Waiting for funding to purchase of materials and the beginning of designing.
 - PITRAP project: the TDR of PITRAP is approved and we are waiting for funding.
 - NNbar project: Technical project of experiment is developed.
- Construction and operational costs:
 - UCN project: Project is carried out mostly by PNPI with Russian Science Foundation support. Estimated cost of the project 8000 KEuro.
 - Neutrino-4 project: Project is realizing mostly by PNPI with JINR and NEOS collaboration. Estimated cost is 500 KEuro.
 - Crystal-diffraction EDM project: possible contribution from the European partners (ILL, France) could be in participation in the construction system of superconducting 3D polarization analyzer CRYOPAD. Estimated cost of the project 500 KEuro.
 - PITRAP project: possible contribution from the European partners could be in participation in the construction of a trap, especially in providing a superconducting magnet, which can cost from 50 to 500 KEuro (in dependence of homogeneity and age).
 - NNbar project: Project is carried out by PNPI. Estimated cost of the project 10000 KEuro.