Report on DANSS experiment

1 Goal of the experiment

The DANSS experiment is looking for sterile neutrino using neutrino from nuclear power plant. Compare to the other experiment, DANSS is located close to a commercial nuclear reactor near Dubna benefiting of a high flux and the experiment is pace on a movable device allowing varying the distance from the core. The technique is original and based on scintillator bars read by fiber allowing a high segmentation to detect neutrino interactions. The search of sterile neutrino is a global competition and DANSS was one of the first experiments dedicated to this search. They published in Spring 2018 with the best limits on the oscillation parameters including sterile neutrino.

2, Contributions of the JINR Group

The main contributions to the detector are coming from JINR Dubna. It includes 2500 scintillators strips associated to 2500 SiPMs, an active muons veto, slow control, shielding and acquisition electronics.
The JINR team has ensured the installation of the detector at the Kalinin Nuclear Power Plant and the data taking is under the responsibility of JINR physicists.
There is also a development of new generation of detector called S-cube in collaboration with Czesch Republic.
There are visible and crucial contributions on this experiment by the JINR team.

3 Plan

The plan is to increase statistics to improve the sensitivity to cover the parameters corresponding to the anti-neutrino reactor anomaly.
The detector has also by-products as per example the measurement of neutrino spectrum at a close distance of the core of the detector.
There is a plan to develop and to test of new version of the detector which is not described in the text.

4 Publications

There 3 publications in high rank journal in the last two years including the first results. It is correct.

5 PhD theses

2 are in preparation. This is may be a weak point taking into account the JINR contributions

6 Talks

8 conferences given by several speakers in the last 2 years. It is correct.

7 Group size, composition and budget

14 physicists are involved in the project corresponding to about 9 FTE. The team is well suited for the project in term of competences and personal. This is expected to be stable in the next 2 years.
The budget requested is mainly to develop a new detector. The request seems reasonable in this context but details are missing.

Comments

DANSS is an original idea from JINR planned to be used to monitor the reactor neutrino flux at the beginning. The JINR has successfully adapt this idea to the search of sterile neutrino which is nowadays one of the most important question in neutrino physics. In the global competition DANSS experiment is presently the most sensitive one. The experiment profits also of the favourable conditions offered by the Kalinin nuclear power plant to have a movable detector at 10 m from the core. The JINR is the main leader of this experiment and by this fact has a very high visibility in this field. The priority is to complete the data taking to exclude most of the oscillation parameters corresponding to RAA.
The team plane to develop a new detector and to test it at KNPP but it is not clear what will the added value of this new detector in the global competition compare to the expected results from DANSS and competitor and the time scale. With DANSS detector and the proximity of the Kalinin nuclear power plant, JINR has also a unique opportunity to allow the education of young physicist in neutrino physic detector and analysis.
The team is composed of experimented physicists in neutrino physics and young physicists. The preparation of a new detector and the possible participation to Neutrino4 should not interfere with the present DANSS experiment in order to insure the best return on investment.
It is difficult to comment the budget without detailed description of the development of the new detector and there is no information about the improvement expected by the new detector.