LSC Scientific Committee
15th Meeting
November 20,21, 2014
Canfranc Estación, Spain

Summary, Conclusions and Recommendations

EXP-05 NEXT

The committee congratulates the NEXT Collaboration for the continuous achievements and the impressive progresses on the construction of the first detector demonstrator and the understanding of its basic performances. Among the excellent work produced, the points listed below were particularly appreciated:

- Infrastructure:
  - The completion and installation of the platform and castle structures
  - The completion of the gas system
- The progresses of the NEW detector (TPC of 50 cm length in a small ~1m vessel)
  - The completion of the pressure vessel at the factory
  - The production of the Energy Plane and the assembly test of the sapphire window (including the use of brass screws)
- The strategy adopted for cleaning, assembly and test the vessel and the energy plane
- The performances of the new SiPMs produced by SensL (better radio-purity, gain, temperature dependence and dark current wrt the Hamamatsu one)
- The solutions adopted for Tracking Plane:
  - The potting solution adopted for the feed-through
  - The decision of constructing a full mock-up of the Tracking Plane
  - The progresses for the construction of the field
  - The quartz anode plane (featuring the Dark Side approach) is ordered; a series of groves is foreseen on the mechanical structure in order to limit the effect of the discharges
  - The clear experimental reconstruction in the NEXT-DEMO prototype of two-electron tracks corresponding to pair production with a ^{232}Th source, requested by the Committee one year ago and now successfully achieved.
- The progress in understanding the functioning and the performances of the detector and the excellent results obtain on radio-purity measurements and background suppression. In particular, the Committee has appreciated the detailed evaluation of the contributions to the final NEXT-100 background in the Region of Interest (ROI) from the various detector elements, based on an intensive campaign of specific radioactivity measurements.
- The very convincing studies of Radon contamination that conclude that the rate can be suppressed by 3 orders of magnitude provided that a decontaminated atmosphere surrounds the detector. The Committee would like to stress that

for the first time the Radon issue has been approached with a fully quantitative analysis, establishing precise correlations (and therefore well-defined targets) between the ^{222}Rn activity level outside and inside the detector and the background in the ROI for NEXT-100.

The scientific committee acknowledges the large progresses made by the NEXT experiment: the new design and hardware solutions presented, the tests and the simulation performed. The reviewers did not identify any substantial problem and therefore encourage the NEXT group to proceed at full speed to the construction of the NEW detector. The team should work with the laboratory to ensure that any safety requirements are understood and planned for. The team should also understand that laboratory approval will be required prior to use of the enriched isotope. This approval will require a clear scientific justification as well as a demonstration of technical readiness.