

Report on the Aspera Roadmap

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ABSTRACT

The talk will give an overview of the recommendations of the Aspera roadmap, with an emphasis on the parts related to underground physics. The prominent recommendations on the corresponding experiments are:

Dark Matter: The dramatic progress of the liquid-xenon technology over the past 2-3 years demonstrates a high momentum, which must be maintained. The recently approved XENON1t at Gran Sasso laboratory could start operation in 2014/15. The bolometric experiments CDMS and Edelweiss have recently provided competitive upper limits and move towards a closer US-Europe coordination. We recommend supporting the development of EURECA, which envisages 1 ton of sensitive mass, eventually in a common US-Europe framework. Looking beyond the scale of one-ton, we strongly recommend that DARWIN, a program to extend the target mass of noble liquids to several tons, is pursued and supported.

Neutrino properties: Several highly important experiments in Europe are either in the commissioning phase or in the final years of construction: GERDA, CUORE and the demonstrator for SuperNEMO will search for neutrino-less double beta decay, KATRIN for neutrino mass via single beta decay. Double CHOOZ, a nuclear reactor experiment, is studying neutrino oscillations. We renew our strong support for these experiments and look forward to first results. Beyond this, we recommend phased experimental approach in neutrino-less double beta decay with a sensitivity (ton scale masses) exploring fully the mass range predicted by oscillation experiments for the inverted mass hierarchy.

Low-energy neutrino astrophysics and proton decay: A megaton scale low-energy neutrino astrophysics and proton decay detector for astroparticle and accelerator-based neutrino measurements is addressed by the LAGUNA design study. The scientific goals combine high-risk research addressing several fundamental questions of physics (proton decay, CP violation) with exciting neutrino astrophysics (e.g. supernova, solar, geo- and atmospheric neutrinos). The committee recommends that the study be pursued within the LAGUNA-LBNO program, including options with and without a new neutrino beam. Due to the high cost (350-700 M€), depending on site and type of detector) and the long development time, the committee recommends that this program be pursued in a global context. Given the close relation to beam related neutrino oscillation projects, the urgency of its realization depends strongly on the output of the current accelerator and reactor program and in particular on whether the missing neutrino mixing parameters are in the range that would permit a series of very exciting new measurements (neutrino mass hierarchy, CP violation etc). LAGUNA is therefore clearly at the interface with the CERN European Strategy Update to be delivered by the end of 2012. As such the LAGUNA project constitutes a high astroparticle physics priority to be discussed within the CERN strategy update process.