Contribution ID: **14** Type: **not specified**

NEXT a high-pressured Xenon-based experiments for ultimate sensitivity to a Majorana neutrino

In this paper we describe:
1. An innovative type of Time Projection Chamber, which used high-pressure Xenon gas (HPGXe), moderate electric fields and electroluminescence amplification of the ionization charge as the basis of a 3D apparatus, capable of fully reconstructing the energy and topological signal of rare events.
2. An specific design of such HPGXe TPC, the NEXT-100 detector, that will search for ββ0ν events using100–150kgofXenonenrichedintheisotope136XeN˙EXT-100hascompletedanaccelerated and very successful R&D period and is in construction phase. It will take data at the Canfranc Underground Laboratory (LSC) in Spain. The commissioning run is foreseen in late 2013 or early 2014.
3. Physics arguments that suggest that the HPGXe technology can be extrapolated to the next-to- next generation (e.g, a fiducial mass of 1 ton of target), which will fully explore the Majorana nature of the neutrino if the mass hierarchy is inverse.
We point out that the NEXT program may of of great interest for the European Strategy, both for technological reasons (the intrinsic interest of the innovative HPGXe detectors with EL amplification and solid state sensor readout) and its large physics potential. We point out that Xenon is the easiest and cheapest target for a future 1 ton detector and that the NEXT program can be complementary to the diode and bolometer based detectors (e.g, Gerda, Cuore), in much the same way as the Majorana and EXO experiment are considered complementary in the USA.
We thus propose that the European Strategy includes the development of a large HPGXe detector, for ββ0ν (and eventually for DM searches).

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