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Title: `Large underground, liquid based detectors for astro-particle physics in`

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In the past years, it has been understood that large liquid detectors are very powerful for the studies of elementary particle and astro-particle physics. Therefore, it is a natural idea to study the possibilities with larger liquid detectors. This report summarizes the studies of future large liquid detectors and their sensitivities to particle and astro-particle physics. The referee recommends publishing this paper as soon as possible.

However, the referee finds some comments, and recommends further improving the manuscript before the publication. The comments are summarized below:

1) page 6 middle: "In order to be sensitive to DUV scintillation, ..." The referee does not know what is DUV. Some explanation might be useful to the readers.

2) page 8, 7th line from the end of Section 2: "...., and the and the ..." should be "..., and the ..."

3) page 12, 8-9th lines: "Up to a factor of two improvement in efficiency is expected for models like $p- > e^+\gamma$ and $p- > \mu^+\gamma$, ..." The referee does not understand why "up to a factor of two improvement in efficiency" can be possible in liquid Argon. For example, the referee refers G.Blewitt et al., PRL 55, 2114 (1985). In this report, the authors discussed that the efficiency for $e^+\gamma$ in a water Cherenkov detector was 66%. One cannot expect a factor of two improvement in efficiency in any detector.

4) page 15 middle: "For MEMPHYS one should rely on the detection of the decay products of the K^+ since its momentum (360MeV) is below the water Cherenkov threshold of 570MeV: a 256MeV/c muon and its ....." The referee noticed that some numbers might be wrong:
$360MeV \rightarrow 340MeV/c$
$570MeV \rightarrow 570MeV/c$ (there must be "/c")
$256MeV/c \rightarrow 236MeV/c$

5) page 17: middle: "IBD" is not defined.

6) page 20, Table 7: This is a question from the referee: Is it really true that the "Earth effect" affects both the nu_e and $nu_e - bar$ signal even for $sin^2\theta_{13} < 10^{-5}$? It seems there is no mention of this effect in the text. If this is true, this should be discussed in the text, including the reason for such effect.

7) page 21, Fig.8: What are "LL", "KRJ" and "TBP" ?

8) page 23, around 14th line from the bottom: The authors discuss the possible detection of pep neutrinos. However, people understood that the detector of pep neutrinos might not be easy if the detector is not located in very deep underground. The referee recommends discussing the possible background at the candidate site.

9) page 24: 4th line: ".... a reduction factor of $3 * 10^{-4}$) [102]." $\rightarrow$ ")" after 10^{-4} must be eliminated ?

10) page 24, Eq.(4): N^{Abs-GT} and N^{Abs-F} are not defined.

11) page 28, last para. and page 29 Table 10: The referee does not understand the way to calculate the statistical significance. As an example, the referee would like to discuss the numbers in the first row in table 10: The Top

and Bottom events are 223 and 266, respectively. For simplicity the referee assumes that there is no systematic error. In this case, one can estimate the statistical significance of the Bottom event excess by; (266-223)/sqrt(266)= 2.6 sigma. This is the most optimistic case. However, the authors estimate the significance of 3.1 sigma. The referee urges the authors to check the significance again. If what the authors claim is correct, it is recommended to write the statistical method employed in this paper.

12) page 30, 2nd para.: "In MEMPHYS, one expect 10 times more geo-neutrino events ...." The referee does not understand why only "10 times more". If one compares the number of protons in the KamLAND and MEMPHYS detectors, the difference must be about 1000. The author should explain why "10 times more" rather than "1000 times more". In addition, the referee feels that this paragraph should be improved significantly. Otherwise, the reader might feel that the authors are simply dreaming. At least it is recommended refering the SNO trigger threshold rather than the Super-Kamiokande threshold, since SNO had much careful selection of the detector materials and achieved the lower threshold than Super-Kamiokande.

13) page 32, 4-5th lines from the bottom: ".... The significant deficit, interpreted in terms of neutrino oscillations enables a measurement of θ_{12} ..." The referee thinks that this sentence is slightly misleading, since the θ_{12} parameter is essentially determined by the solar neutrino experiments.

14) Figs.22 and 26: It seems that the definition for the CP violation seems different between the two figures. In Fig.26, the excluded regions covers delta = +/- pi. However, in Fig.22, the excluded region does not extend to delta = 0 or 2pi. These 2 figures should use the same definition for the "CP violation sensitivity". In addition, the referee feels that the readers might not show much interest in seeing the CP sensitivity for the already excluded Δm^2_{12} regions (Fig.26).