XV Neutrino Telescopes Workshop
Palazzo Franchetti -Venice 11--15 March 2013,
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Poster Session
Submission of Abstract

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Title of the poster: Reactor antineutrino signal all over the world

Abstract:

Antineutrinos from terrestrial 238U and 232Th decay chains (the so called geo-neutrinos) have been recently detected both by Kamland [1] and by Borexino [2] experiments. Future experiments for geo-neutrinos dectection have been proposed in several location in the world (e.g. Lena project in Europe, Dusel detector in USA and Hawaii Anti-Neutrino Observatory).

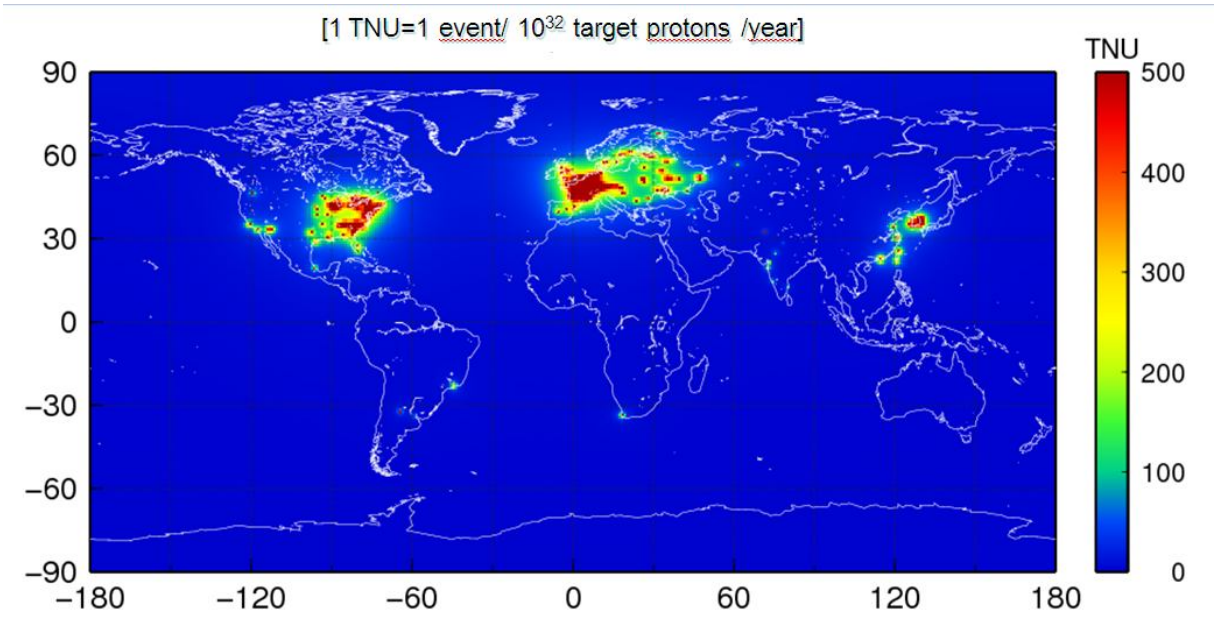
The main source of background of such experiments is given by antineutrino produced by nuclear plants. For instance, in Borexino the expected reactor signal, assuming a 100% detection efficiency, is 17.2 (1 ± 5.4%) events/300ton/yr, comparable to geo neutrino signal. So a detailed calculation of such antineutrino flux in mandatory for an accurate measuraments of geo-neutrinos.

With this aim, we performed a calculation of reactor antineutrinos flux all over the world. A first analysis has been presented at Neutrino Geoscience 2010 [3] and now we will show an updated estimate of reactor antineutrino signal, with particular attention to the sites proposed for the new geo-neutrino experiments. In our calculation we take into account the most updated data on Thermal Power for each nuclear plant [4], on reactor antineutrino spectra [5] and three neutrino oscillation mechanism [6].

We also perform a detailed analysis on the sources of uncertainty in reactor signal prediction: the total uncertainty is of the order of 4-5%, the main contribution given by mixing angle, antineutrino spectrum, fuel composition and thermal power.

Summary:

We report below one of the most representative result of our analysis: a worldwide map of reactor antineutrino signal, measured in TNU. The figure corresponds to the reactor and neutrino data as available at June 2012.



References:

[1] Kamland coll. Nature 436, 499-503 (2005), Nature Geoscience 4, 647 (2011)
[2] Borexino coll. Phys. Lett. B 687, 299-304 (2010).
[3] B. Ricci et al, Talk at Neutrino Geoscience 2010, LNGS, 6-8 Oct. 2010
http://geoscience.lngs.infn.it/Program/Pdf_presentations/Ricci.pdf
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[5] Th. A. Mueller et al, Phys.Rev.C83:054615,2011
[6] G. Fogli et al. , arXive:1205.5254v3.