Estimation of background index in the LArGe set-up (first step)

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At this moment

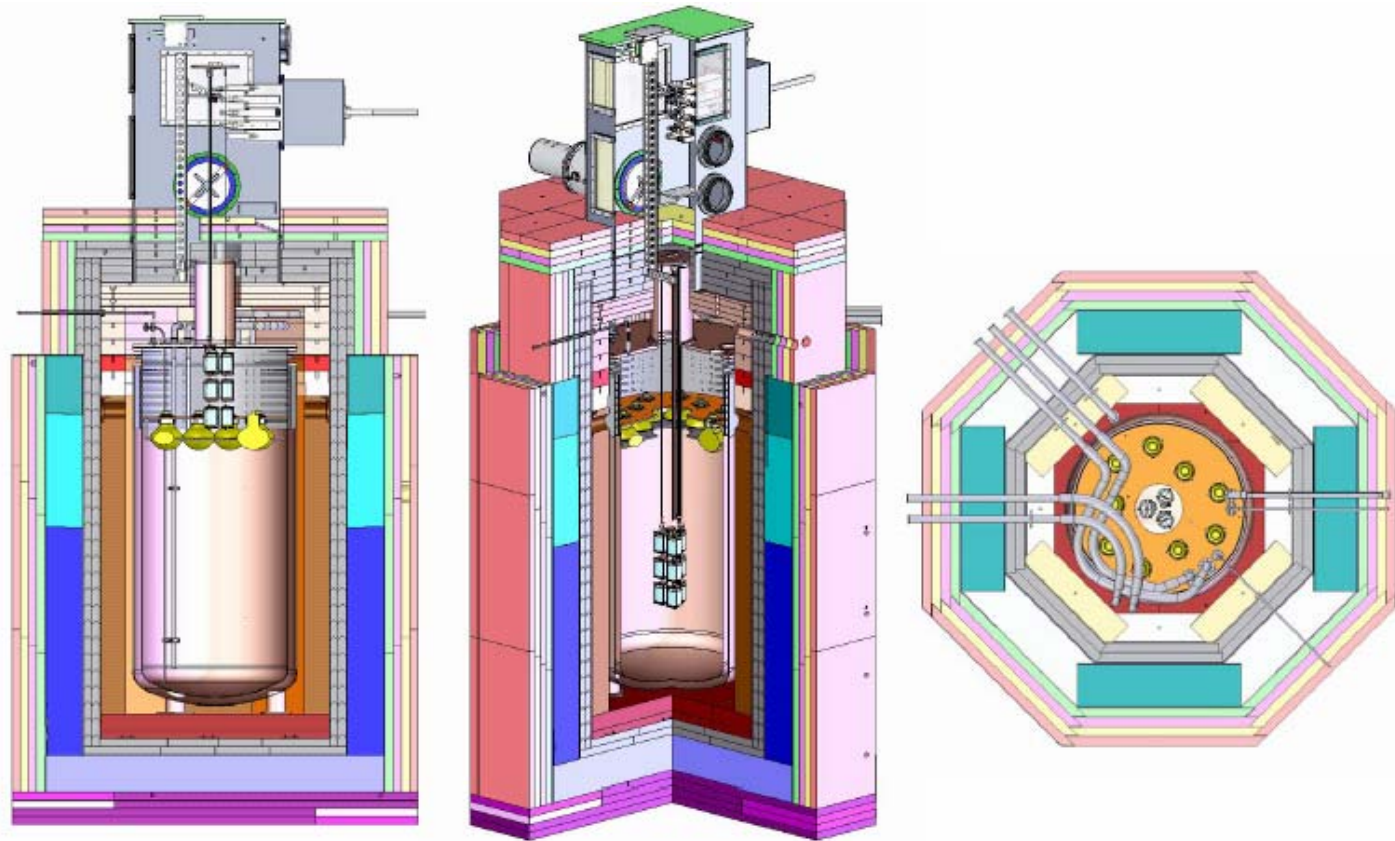- The geometry of the set-up are implemented Shown in fig1. and fig2.

Fig.1
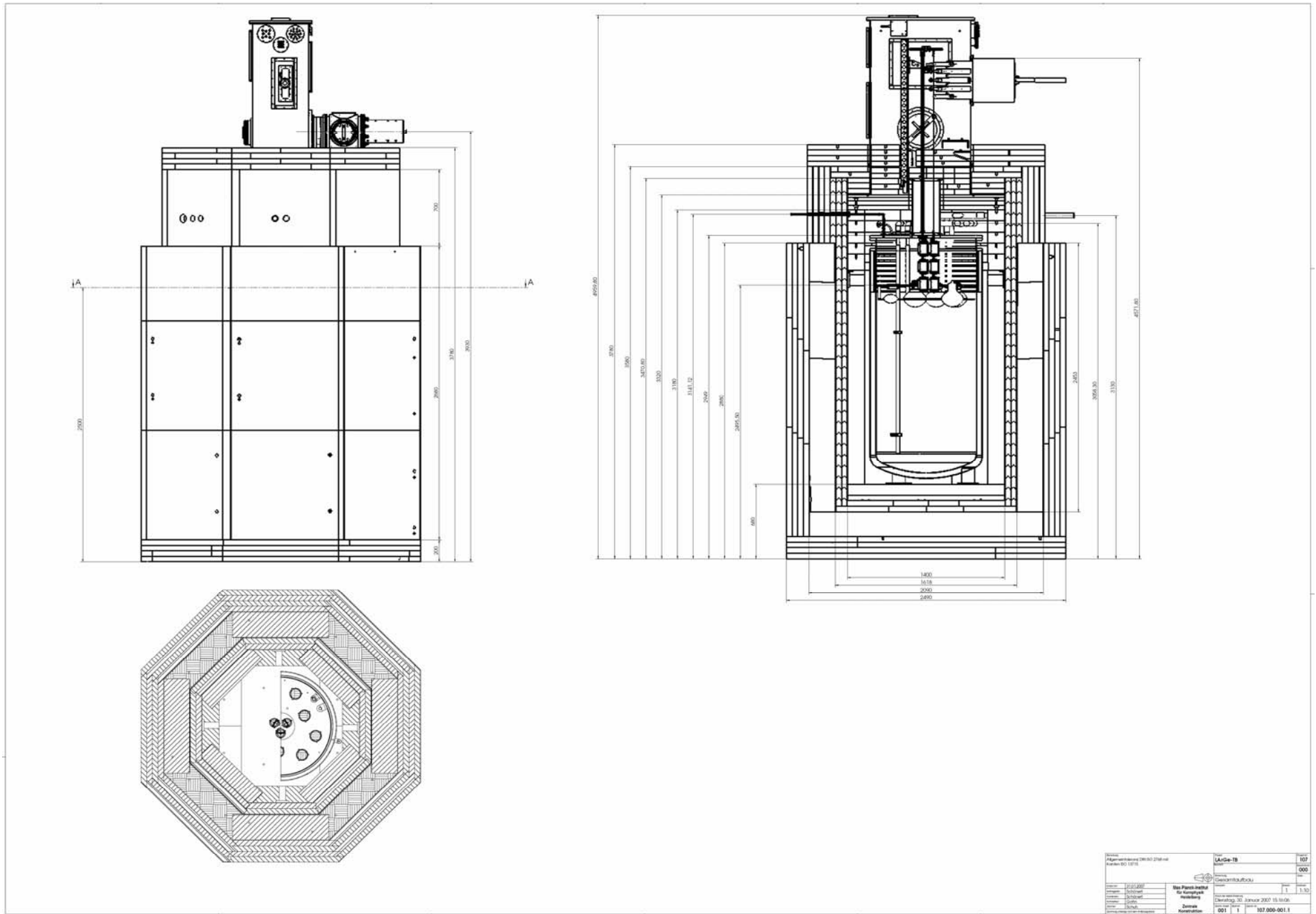
Fig.2

At this moment

- The sources, which could get considerable contribution into the region of neutrinoless double beta-decay (2000 keV-2080keV) are taken into account

  They are Ra-226 (U chain) and Th-228 (Th chain) and input data are in table1.

Table1. Contaminations of materials by Ra-226 и Th-228 в µBq/kg.

	silicon	teflon	copper	PMT	LAr
Ra-226	193	160	16	2600	1
Th-228	28	160	19	2200	1

The results of MC-calculations

All nine detector work independently

Table 2. Background index counts/(keV·kg·year) in energy region of 2000-2080 keV for all nine detectors.

	LAr	cu-det	si-det	teflon-det	PMT	cryostat	cu-shield	sum
Ra-226	0.0008	0.000264	0.000037	0.007	0.0002	0.000643	0.0011	0.010044
Th-228	0.003	0.00085	0.000014	0.0011	0.00157	0.0028	0.0058	0.015134
sum	0.0038	0.001114	0.000051	0.0081	0.00177	0.003443	0.0069	0.025178

Single spectra of all nine detectors (anticoincidence)

Table 3. Background index in energy region of 2000-2080 keV
for sum of single spectra of all nine detectors (counts/keV·kg·year) .

	LAr	cu-det	si-det	teflon-det	PMT	cryostat	cu-shield	sum
Ra-226	0.00066	0.000208	0.000030	0.006	0.0002	0.000623	0.0006	0.008321
Th-228	0.0022	0.00042	0.000007	0.0005	0.00114	0.0021	0.0043	0.010667
sum	0.00286	0.000628	0.000037	0.0065	0.00134	0.002723	0.0049	0.018988

Single spectra of the detectors with argon spectrum anticoincidence

Table 4. Background index in energy region of 2000-2080 keV
for sum of single spectra of all nine detectors with argon anticoincidence
(counts/keV·kg·year) .

	LAr	cu-det	si-det	teflon-det	PMT	cryostat	cu-shield	sum
Ra-226	0.0000173	0.0000530	0.00000142	0.0025	0.0001	0.000081	0.00037	0.00312272
Th-228	0.0000034	0.0000016	0.00000002	0.000002	0.00005	0.000035	0.00047	0.00056202
sum	0.0000207	0.0000546	0.00000144	0.002502	0.00015	0.000116	0.00084	0.00368474

Conclusion

There is a positive effect of use of liquid argon, but it is very important to minimaze light losses in the volume of LArGe.
Calculated sum background index is around $4*10^{-3}$ Bq/keV*year*kg.

In real life it will be more and we hope we can reach the background level about 10^{-2}

What shall we plan to do further?.

- To get response functions for all possible background sources and for all variant of their localization

- From experimental spectrum and calculated response functions of the detectors by fitting to reach the maximum of likeness with experimental spectrum.

- To solve this more complicated task all more intense peaks in all energy spectrum should be taken into account as well as behavior of smooth part of spectrum.

Table 2.

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