R.A. budget update with SaG4n

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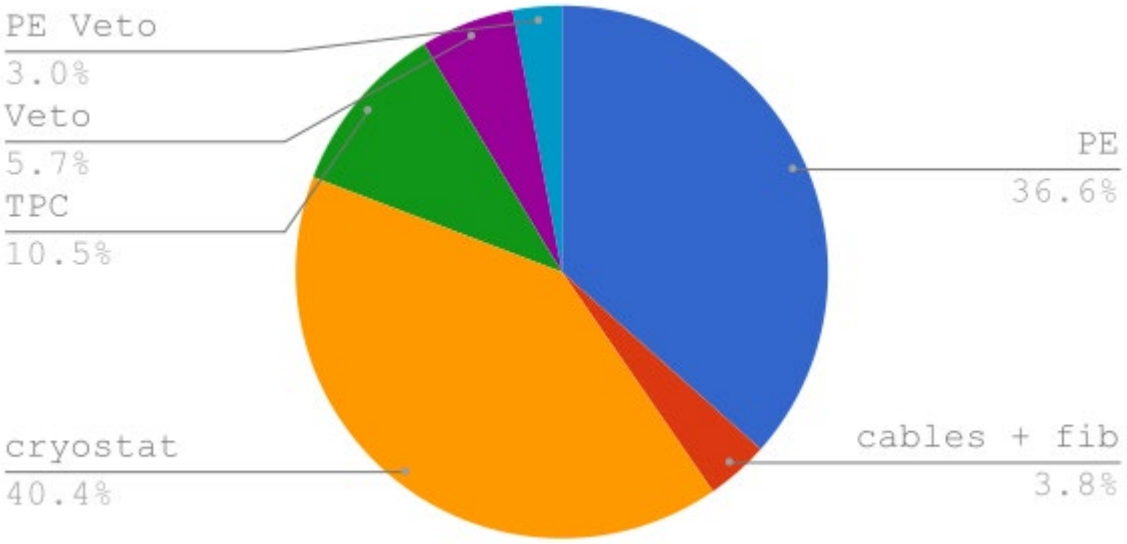
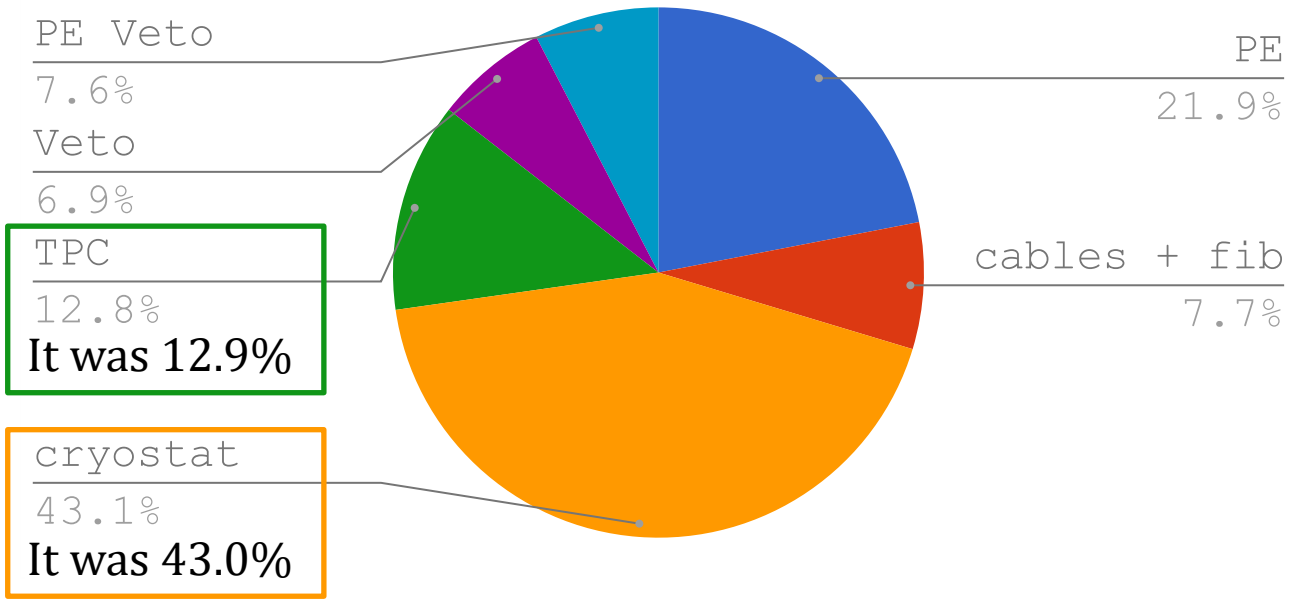
List of new results

Material	Status
Neutron yields for the (α,n) reactions (using SaG4n and NeuCBOT)	
Sapphire window	done
Teflon	done
Vikuiti (PET)	Done
TPB	Done
Clevios (PEDT)	Done

General overview





NeuCBOT (TALYS-1.6),
version January 26
0.150 NR after cuts in 200 t y
10 largest contributors -> 0.10 nAC (67%)
20 largest contributors -> 0.13 nAC (87%)

SaG4n with JENDL-TENDL2017 (work in progress)
0.079 NR after cuts in 200 t y (the same number as it was on Jan 26)
Analyzed 10 out of the 10 largest contributors
in the sheet based on TALYS-1.6
Analyzed 19 (+1) out of the 20 largest contributors
Analyzed 50 (+5) out of the 63 materials
that give a nonzero contribution (79% (+8%) by the number of materials)
Preliminary 40-50% reduction

Sapphire window

Composition

Element	Mass fraction, %
Al	52.93
O	47.07

Density: 3.98 g/cm^3

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	^{232}Th	1.44E-6	1.12E-5	1.01E-5
	^{235}U	1.34E-6	9.97E-6	8.42E-6
	^{238}U upper	7.58E-8	2.21E-7	1.99E-7
	^{238}U middle	8.61E-7	6.61E-6	5.79E-6
	^{238}U lower	7.02E-08	6.94E-6	2.78E-7

Will be checked

Legend:

0.0	E-9	E-8	E-7	E-6	E-5

Teflon

Composition

Element	Mass fraction, %
C	24.02
F	75.98

Density: 2.2 g/cm^3

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	^{232}Th	12.66E-5	9.39E-5	9.34E-5
	^{235}U	13.12E-5	9.68E-5	9.54E-5
	^{238}U upper	1.16E-5	7.38E-6	7.19E-6
	^{238}U middle	7.94E-5	5.87E-5	5.78E-5
	^{238}U lower	missing	6.49E-5	6.05E-6

Will be checked

Legend:

0.0	E-9	E-8	E-7	E-6	E-5

Vikuiti (PET)

Composition

Element	Mass fraction, %
C	62.50
H	4.20
O	33.30

Density: 1.38 g/cm^3

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	^{232}Th	1.51E-6	1.47E-6	9.66E-7
	^{235}U	1.62E-6	1.56E-6	9.91E-7
	^{238}U upper	2.45E-7	2.35E-7	9.23E-8
	^{238}U middle	9.69E-7	9.42E-7	6.06E-7
	^{238}U lower	1.33E-7	1.07E-6	6.14E-8

Will be checked

Legend:

0.0	E-9	E-8	E-7	E-6	E-5

TPB

Composition

Element	Mass fraction, %
C	93.85
H	6.15

Density: 1.079 g/cm^3

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	^{232}Th	1.89E-6	1.83E-6	1.09E-6
	^{235}U	2.03E-6	1.95E-6	1.09E-6
	^{238}U upper	3.15E-7	3.02E-7	9.08E-8
	^{238}U middle	1.21E-6	1.18E-6	6.75E-7
	^{238}U lower	1.67E-7	1.34E-6	6.09E-8

Will be checked

Legend:

0.0	E-9	E-8	E-7	E-6	E-5

Clevios (PEDT)

Composition

Element	Mass fraction, %
C	51.42
H	2.88
O	22.83
S	22.87

Density: 1.011 g/cm^3

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	^{232}Th	Data for acrylic	1.41E-6	1.02E-6
	^{235}U	Data for acrylic	1.44E-6	9.79E-7
	^{238}U upper	Data for acrylic	2.05E-7	8.58E-8
	^{238}U middle	Data for acrylic	8.84E-7	6.13E-7
	^{238}U lower	Data for acrylic	9.95E-7	5.64E-8

Legend:

0.0	E-9	E-8	E-7	E-6	E-5

General remarks

1) A link to the neutron budget obtained with SaG4n:
neutron_bg_Oct20_with_SaG4n

2) All files related to the study will be available in the CERNBox folder
(use the standard DarkSide password to log in)