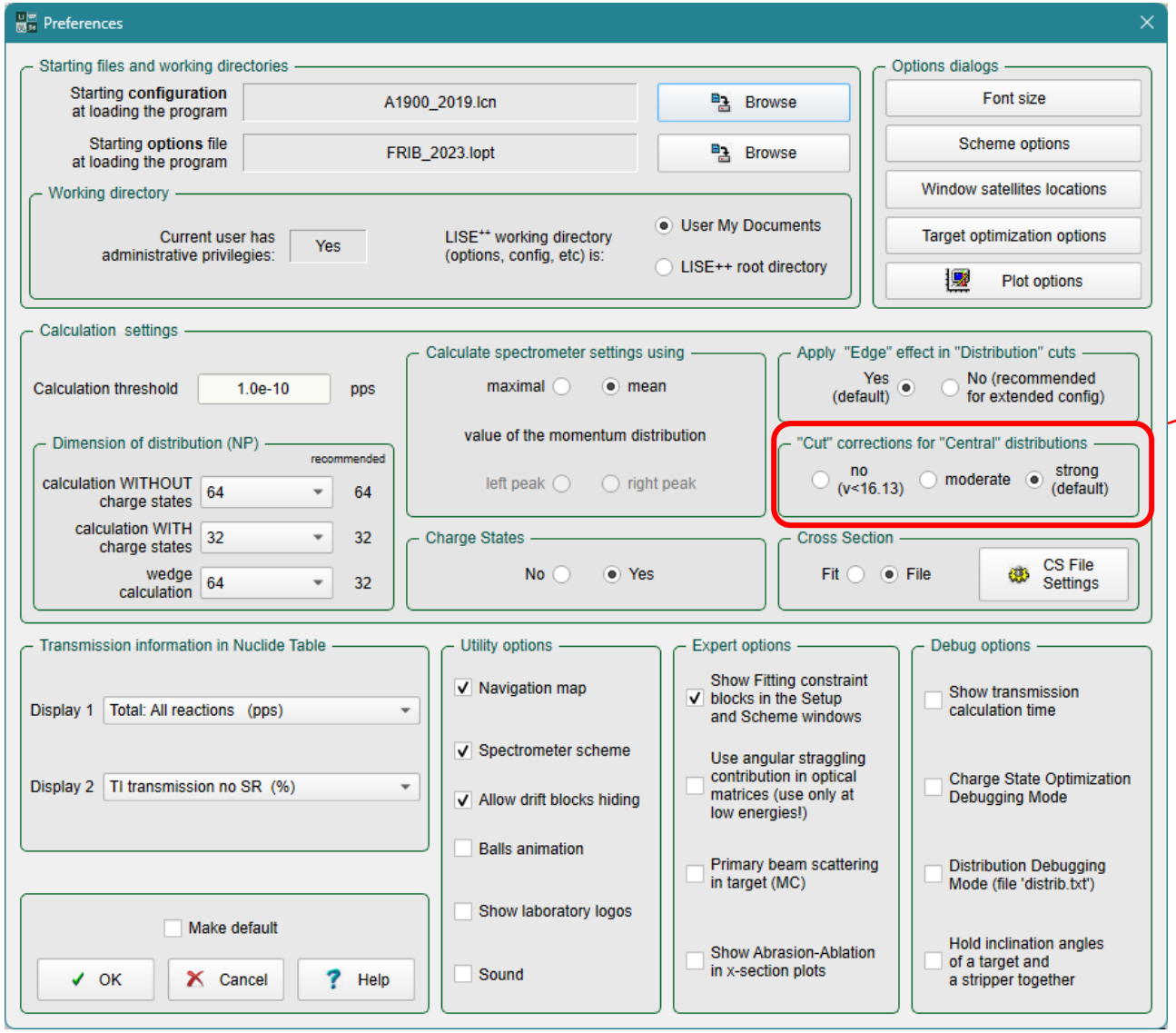
New Transmission option: “CENTRAL CUT”

v.16.13.1
03/26/23

“CENTRAL distribution” : local name for IMAGEs as Cible.DF (class “distribution4”)

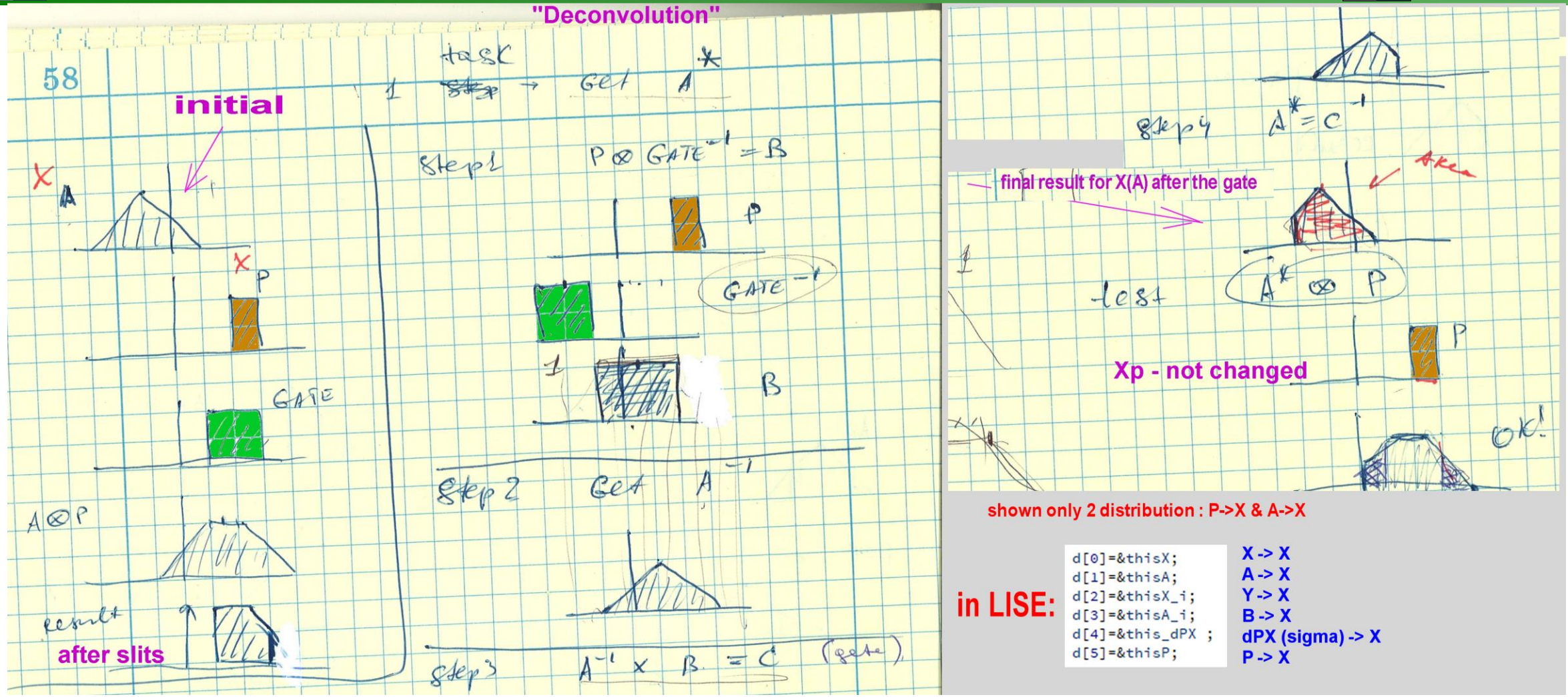
Old problem: low contamination, new Marc’s request



New Transmission option: “CENTRAL CUT”

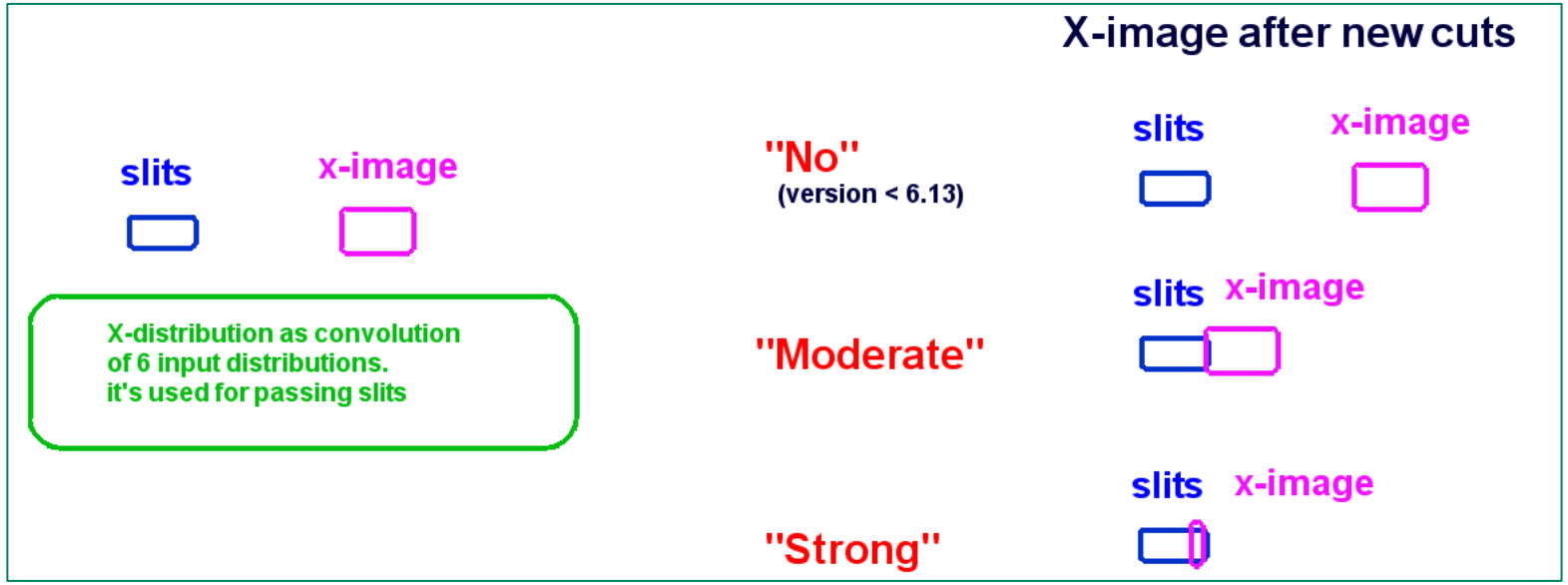
“strong” is Default

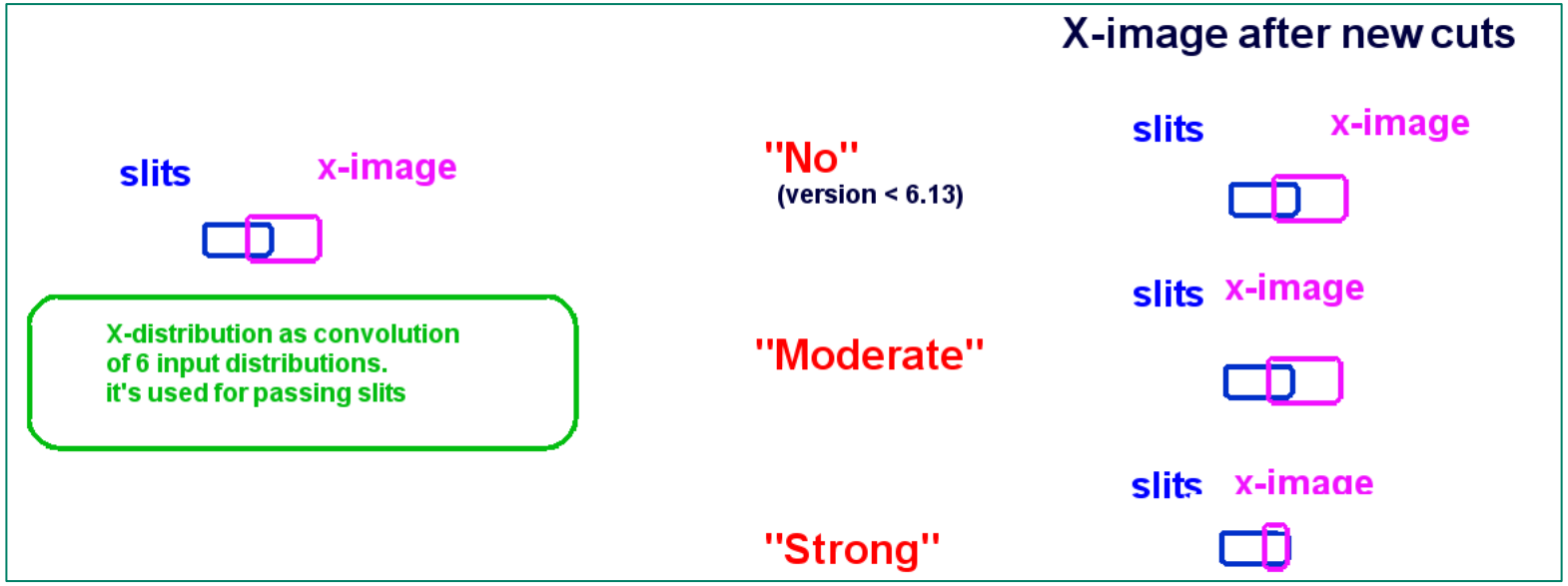
Sketch: passing slits in LISE^{++} and next distribution cuts



- 5 images + 1 sigma (total 6) distributions are convoluted to obtain the final distribution to pass slits
- Cut of a Distribution after slits is obtained with the convolution of other 5 distributions and inverse slit distribution
- In the case of large accumulated uncertainties (thickness defect, straggling and so on), it looks like image ("central") distributions are not cut correctly

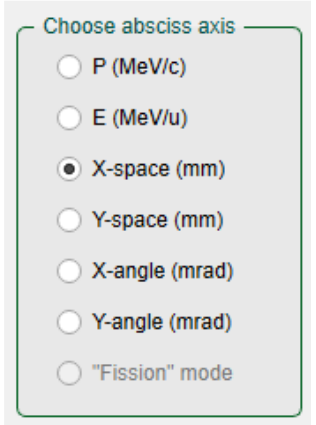
Options : Cut correction for central distributions





Benchmarks with file Debugging_v4.lpp : “No”

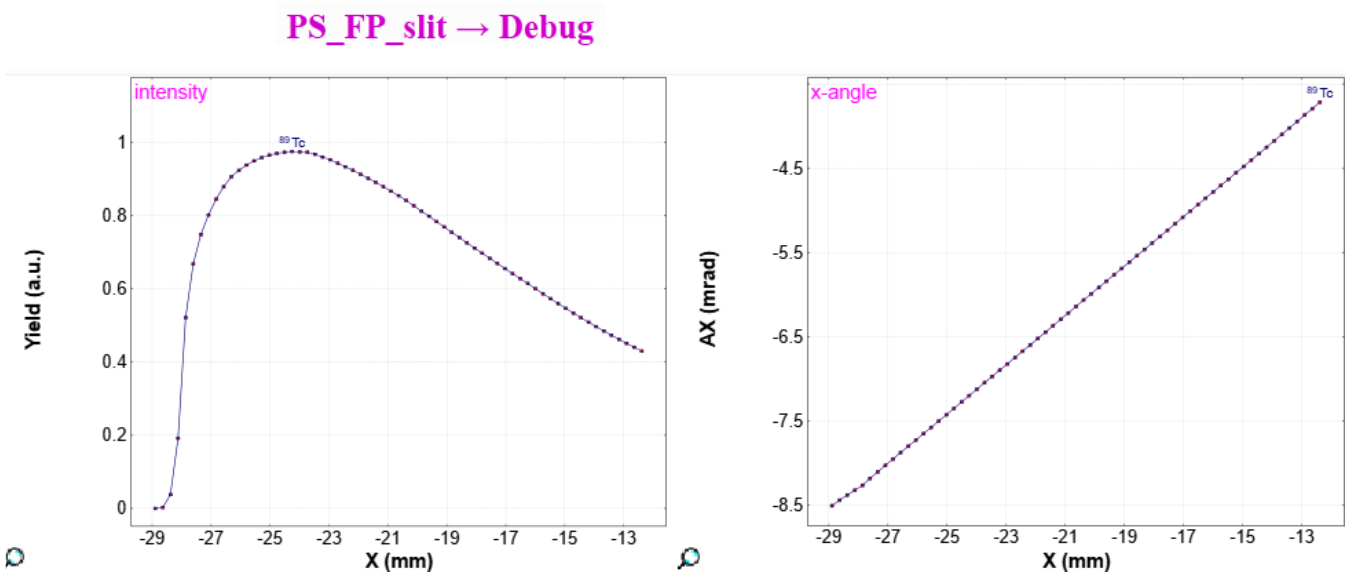
Set Option “No”, then calculate ^{89}Tc



Menu→1D-Plot → Debug Information

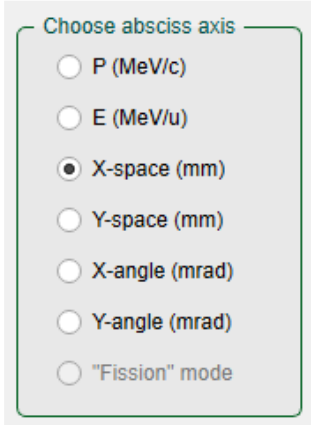
Block name	sPd(MeVc)	sPu(MeVc)	sX(mm)	sY(mm)	P-min	P-max	x-min	x-max	y-min	y-max	a-min	a-max	b-min	b-max	dX
Stripper	0.00	0.00	0.30	0.30	49957	58887	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+7.2
shield	0.00	0.00	6.36	6.36	50097	58747	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+1.1
RAm90	0.00	0.00	6.36	6.36	50097	58747	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+1.1
PS1A	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.7
Beam Dump	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.7
Frag Catchers	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.7
PS1B	0.00	0.00	0.41	0.37	50097	58747	-225.4	184.8	-0.0	0.0	-0.0	0.0	-0.0	0.0	-4.7
PS_I_slits	0.00	0.00	0.41	0.37	51745	56243	-106.7	106.7	-0.0	0.0	-0.0	0.0	-0.0	0.0	-4.7
PS_wdg	122.82	122.23	0.41	0.37	46416	47644	-106.7	106.7	-0.0	0.0	-0.0	0.0	-0.0	0.0	-1.7
PS1C	122.82	122.23	28.81	7.59	46416	47644	-81.1	99.8	-0.0	0.0	-10.3	11.4	-0.0	0.0	+1.5
PS1D	122.81	122.22	0.49	0.45	46416	47644	-28.9	-12.4	-0.0	0.0	-8.5	-3.7	-0.0	0.0	+1.3
PS_FP_slit	25.61	25.48	0.49	0.45	46416	47644	-28.9	-12.4	-0.0	0.0	-8.5	-3.7	-0.0	0.0	+1.3
RA90	25.61	25.48	0.45	0.49	46416	47644	-0.0	0.0	-28.9	-12.4	-0.0	0.0	-8.5	-3.7	-4.0
C_D1	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	18.1	42.3	-0.0	0.0	-24.8	-10.6	+4.9
DB2 slits	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	18.1	42.3	-0.0	0.0	-24.8	-10.6	+4.9
DB2 Wedge	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	18.1	42.3	-0.0	0.0	-24.8	-10.6	+4.9
C_D2	25.49	25.37	0.37	0.70	46416	47644	-0.0	0.0	-44.9	-19.3	-0.0	0.0	19.3	45.2	-3.5
FS_F2S2:SLH_D	25.49	25.37	0.37	0.70	46416	47644	-0.0	0.0	-44.9	-19.3	-0.0	0.0	19.3	45.2	-3.5
C_D3	25.39	25.27	0.62	0.61	46416	47644	-31.3	28.5	17.1	39.9	-0.1	0.1	-72.1	-30.8	+4.9
C_D4	25.39	25.27	1.51	8.08	46416	47644	0.0	0.0	-208.5	-89.3	-0.0	0.0	7.1	16.5	-9.4
FS_F3S2:PM_D1	25.42	25.30	1.51	8.08	46402	47630	0.0	0.0	-208.5	-89.3	-0.0	0.0	7.1	16.5	-9.4
FS_F3S2:PM_D1	25.45	25.33	1.51	8.08	46387	47616	0.0	0.0	-208.5	-89.3	-0.0	0.0	7.1	16.5	-9.4
FS_F3S2:SLH/V	7.85	7.81	1.51	7.69	47389	47616	0.0	0.0	-160.5	-89.3	0.0	0.0	7.1	12.7	-5.5

Menu→1D-Plot → Debug Plot



Benchmarks with file Debugging_v4.lpp : “Moderate”

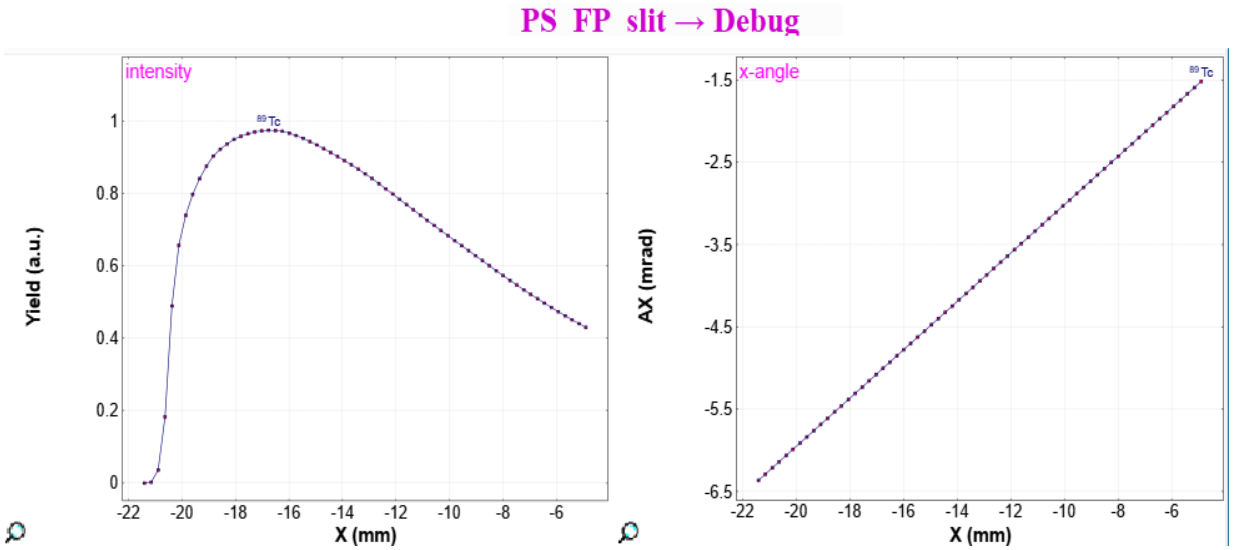
Set Option “Moderate”, then calculate ^{89}Tc



Menu→1D-Plot → Debug Information

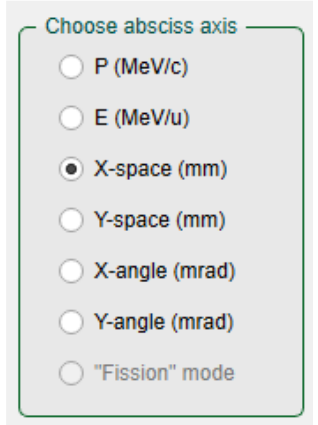
Menu→1D-Plot → Debug Plot

Block name	sPd(MeVc)	sPu(MeVc)	sX(mm)	sY(mm)	P-min	P-max	x-min	x-max	y-min	y-max	a-min	a-max	b-min	b-max	d
Stripper	0.00	0.00	0.30	0.30	49957	58887	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+7.2
shield	0.00	0.00	6.36	6.36	50097	58747	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+1.1
RAm90	0.00	0.00	6.36	6.36	50097	58747	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+1.1
PS1A	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.7
Beam Dump	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.7
Frag Catchers	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.7
PS1B	0.00	0.00	0.41	0.37	50097	58747	-225.4	184.8	-0.0	0.0	-0.0	0.0	-0.0	0.0	-4.7
PS_I_slits	0.00	0.00	0.41	0.37	51745	56243	-106.7	106.7	-0.0	0.0	-0.0	0.0	-0.0	0.0	-4.7
PS_wdg	122.82	122.23	0.41	0.37	46416	47644	-106.7	106.7	-0.0	0.0	-0.0	0.0	-0.0	0.0	-1.7
PS1C	122.82	122.23	28.81	7.59	46416	47644	-81.1	99.8	-0.0	0.0	-10.3	11.4	-0.0	0.0	+1.5
PS1D	122.81	122.22	0.49	0.45	46416	47644	-28.9	-12.4	-0.0	0.0	-8.5	-3.7	-0.0	0.0	+1.3
PS_FP_slit	25.61	25.48	0.49	0.45	46416	47644	-21.4	-4.9	-0.0	0.0	-6.4	-1.5	-0.0	0.0	+1.3
RA90	25.61	25.48	0.45	0.49	46416	47644	-0.0	0.0	-21.4	-4.9	-0.0	0.0	-6.4	-1.5	-4.6
C_D1	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	7.2	31.3	-0.0	0.0	-18.3	-4.2	+4.9
DB2 slits	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	7.2	31.3	-0.0	0.0	-18.3	-4.2	+4.9
DB2 Wedge	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	7.2	31.3	-0.0	0.0	-18.3	-4.2	+4.9
C_D2	25.50	25.38	0.37	0.70	46416	47644	-0.0	0.0	-33.3	-7.6	-0.0	0.0	7.6	33.4	-3.5
FS_F2S2:SLH_D	25.50	25.38	0.37	0.70	46416	47644	-0.0	0.0	-33.3	-7.6	-0.0	0.0	7.6	33.4	-3.5
C_D3	25.46	25.34	0.62	0.61	46416	47644	-31.3	28.5	6.8	29.5	-0.1	0.1	-53.3	-12.2	+4.9
C_D4	25.46	25.34	1.51	9.07	46416	47644	0.0	0.0	-154.4	-35.3	-0.0	0.0	2.8	12.2	-9.4
FS_F3S2:PM_D1	25.49	25.37	1.51	9.07	46402	47630	0.0	0.0	-154.4	-35.3	-0.0	0.0	2.8	12.2	-9.4
FS_F3S2:PM_D1	25.52	25.40	1.51	9.07	46387	47616	0.0	0.0	-154.4	-35.3	-0.0	0.0	2.8	12.2	-9.4
FS_F3S2:SLH/V	22.37	22.26	1.51	9.01	46387	47616	0.0	0.0	-154.4	-35.3	-0.0	0.0	2.8	12.2	-9.4



Benchmarks with file Debugging_v4.lpp : “Strong”

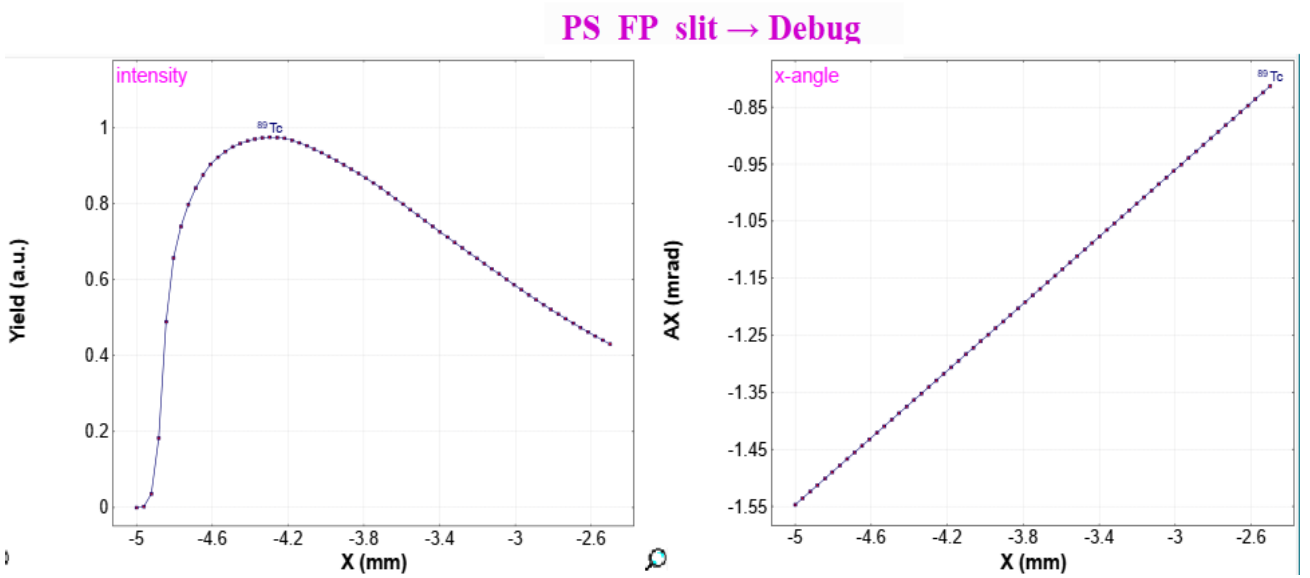
Set Option “Strong”, then calculate ^{89}Tc



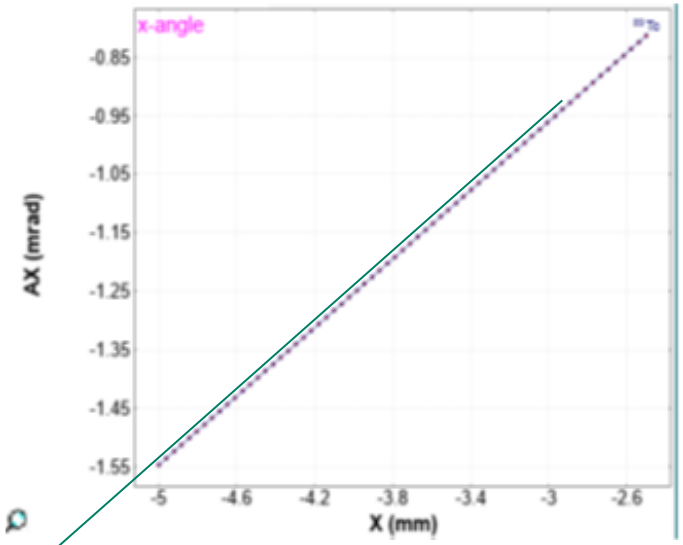
Menu→1D-Plot → Debug Information

Menu→1D-Plot → Debug Plot

Block name	sPd(MeVc)	sPu(MeVc)	sX(mm)	sY(mm)	P-min	P-max	x-min	x-max	y-min	y-max	a-min	a-max	b-min	b-max	d
Stripper	0.00	0.00	0.30	0.30	49957	58887	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+7.
shield	0.00	0.00	6.36	6.36	50097	58747	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+1.
RAm90	0.00	0.00	6.36	6.36	50097	58747	-0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	0.0	+1.
PS1A	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.
Beam Dump	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.
Frag Catchers	0.00	0.00	2.06	25.21	50097	58747	-66.5	81.1	-0.0	0.0	-37.3	45.5	-0.0	0.0	+1.
PS1B	0.00	0.00	0.41	0.37	50097	58747	-225.4	184.8	-0.0	0.0	-0.0	0.0	-0.0	0.0	-4.
PS_I_slits	0.00	0.00	0.41	0.37	51745	56243	-106.7	106.7	-0.0	0.0	-0.0	0.0	-0.0	0.0	-4.
PS_wdg	122.82	122.23	0.41	0.37	46416	47644	-106.7	106.7	-0.0	0.0	-0.0	0.0	-0.0	0.0	-1.
PS1C	122.82	122.23	28.81	7.59	46416	47644	-81.1	99.8	-0.0	0.0	-10.3	11.4	-0.0	0.0	+1.
PS1D	122.81	122.22	0.49	0.45	46416	47644	-28.9	-12.4	-0.0	0.0	-8.5	-3.7	-0.0	0.0	+1.
PS_FP_slit	25.61	25.48	0.49	0.45	46416	47644	-5.0	-2.5	-0.0	0.0	-1.5	-0.8	-0.0	0.0	+2.
RA90	25.61	25.48	0.45	0.49	46416	47644	-0.0	0.0	-5.0	-2.5	-0.0	0.0	-1.5	-0.8	-4.
C_D1	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	3.7	7.3	-0.0	0.0	-4.2	-2.1	+4.
DB2 slits	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	3.7	7.3	-0.0	0.0	-4.2	-2.1	+4.
DB2 Wedge	25.51	25.38	0.63	0.69	46416	47644	-32.7	27.1	3.7	7.3	-0.0	0.0	-4.2	-2.1	+4.
C_D2	25.50	25.38	0.37	0.71	46416	47644	-0.0	0.0	-7.8	-3.9	-0.0	0.0	3.9	7.8	-3.
FS_F2S2:SLH_D	25.50	25.38	0.37	0.71	46416	47644	-0.0	0.0	-7.8	-3.9	-0.0	0.0	3.9	7.8	-3.
C_D3	25.50	25.38	0.62	0.61	46416	47644	-31.3	28.5	3.5	6.9	-0.1	0.1	-12.4	-6.2	+4.
C_D4	25.50	25.38	1.51	10.09	46416	47644	0.0	0.0	-36.0	-18.0	-0.0	0.0	1.4	2.8	-9.
FS_F3S2:PM_D1	25.53	25.41	1.51	10.09	46402	47630	0.0	0.0	-36.0	-18.0	-0.0	0.0	1.4	2.8	-9.
FS_F3S2:PM_D1	25.56	25.44	1.51	10.09	46387	47616	0.0	0.0	-36.0	-18.0	-0.0	0.0	1.4	2.8	-9.
FS_F3S2:SLH/V	25.56	25.44	1.51	10.09	46387	47616	0.0	0.0	-36.0	-18.0	-0.0	0.0	1.4	2.8	-9.



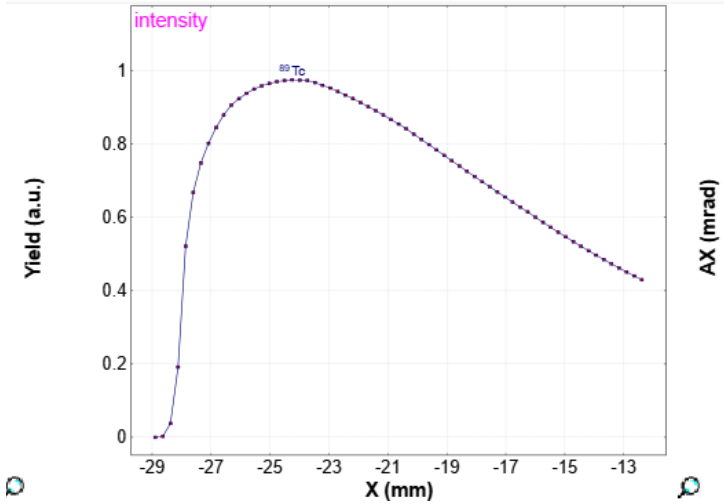
X’ (angle) image distribution calculation with “Central cut” use

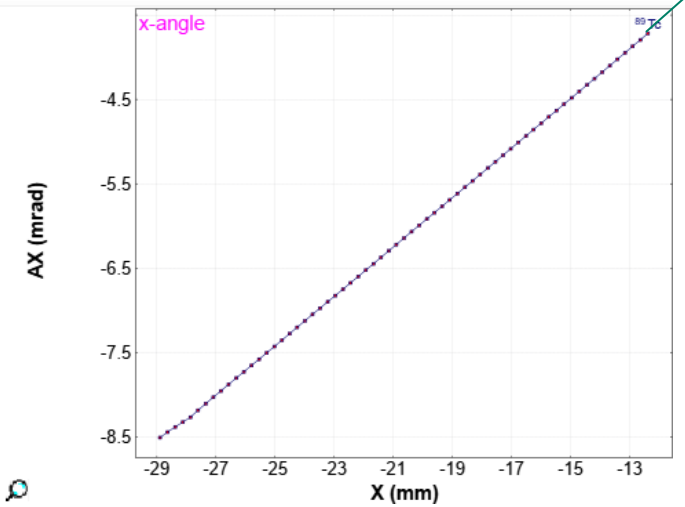


After “Central cut” transmission

Before “Central cut” transmission

PS_FP_slit → Debug





X new → -5.0 : -2.5

X’ (angle) image distribution : extrapolation

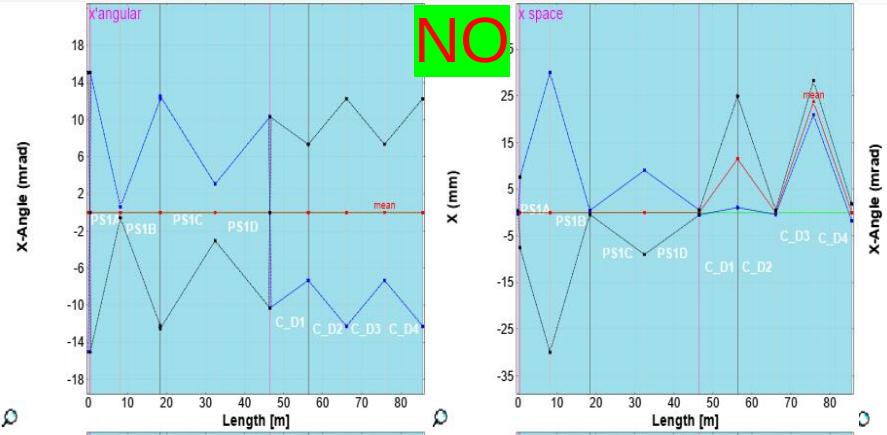
X old → -28.9 : -12.4

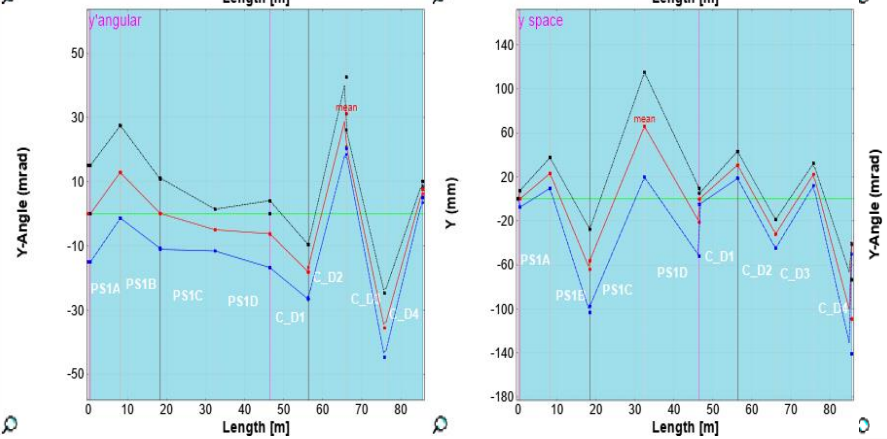
Benchmarks

		method	89Rh	89Ru	89Tc	89Mo
file v4 PS_I -100 : +100 PS_FP_slits : -5 : +5 C_D4 Y: -50 : +50	distribution	No	0%	12.02%	0.03%	0%
		Moderate	1.70%	11.99%	1.08%	0.007%
		Strong	11.34%	13.76%	7.38%	0.20%
	Monte Carlo		6.40%	16.60%	7.23%	0.09%
		method	89Rh	89Ru	89Tc	89Mo
file v3 PS_I -10 : +10 PS_FP_slits : -4 : +4 C_D4 Y: --25 : +25	distribution	No	0%	2.64%	0%	0%
		Moderate	0.06%	2.64%	0.066%	7.1e-5%
		Strong	0.14%	2.64%	0.134%	3.1e-4%
	Monte Carlo		0.28%	2.45%	0.208%	
		method	89Rh	89Ru	89Tc	89Mo
file v2 PS_I -2 : +2 PS_FP_slits : -2 : +2 C_D4 Y: --100 : +100	distribution	No	0%	0.218%	0%	0%
		Moderate	0.019%	0.291%	0.022%	5.25e-5%
		Strong	0.019%	0.291%	0.022%	5.25e-5%
	Monte Carlo		0.02% 10 events	0.337%	0.023%	

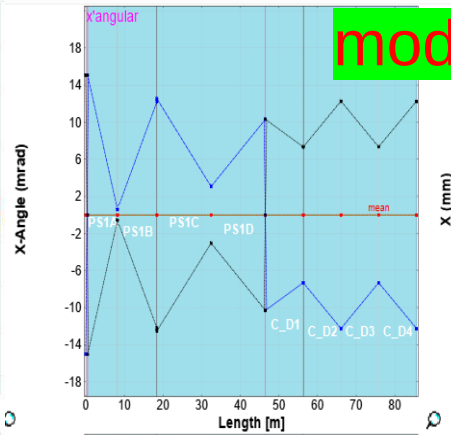
Benchmarks with file Debugging_v4.lpp

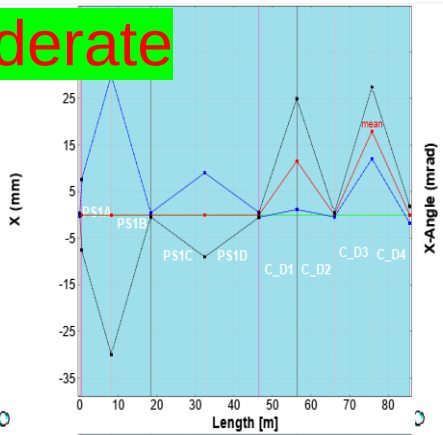
NO

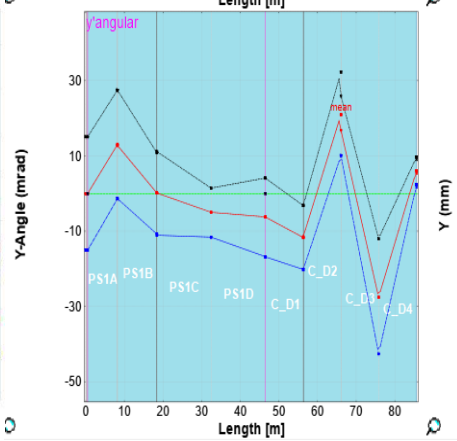


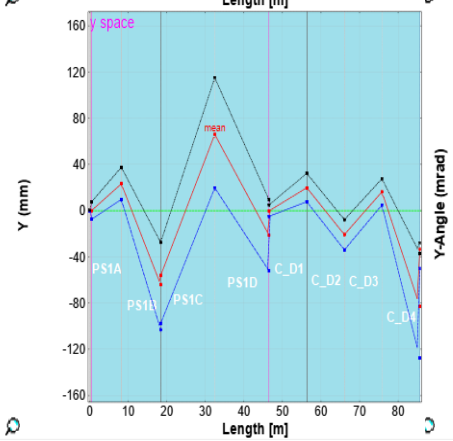


moderate

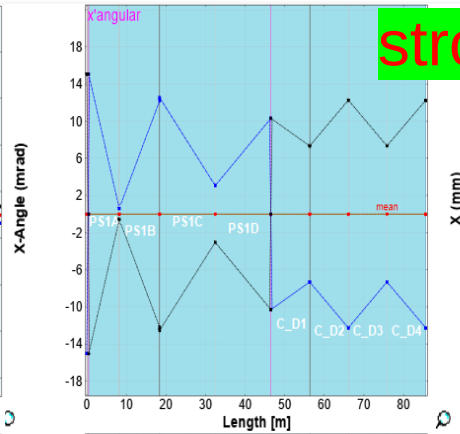


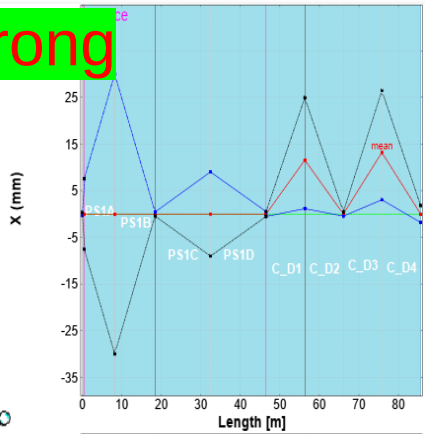


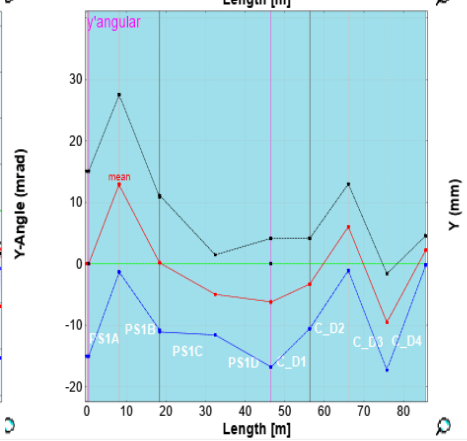


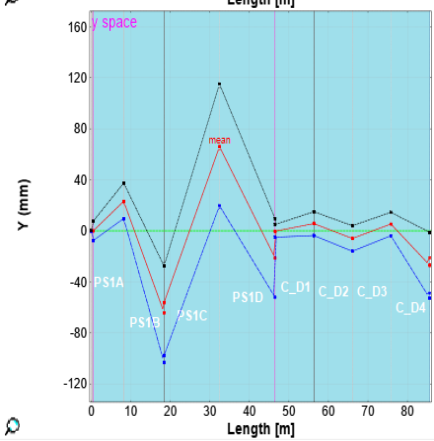


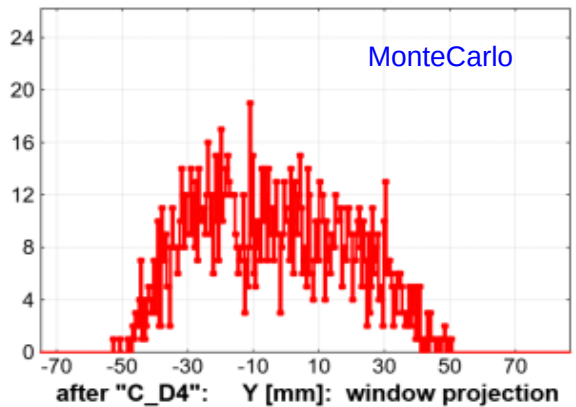
strong











Benchmarks with file Debugging_v4.lpp : "Strong" vs. MC @ DB2

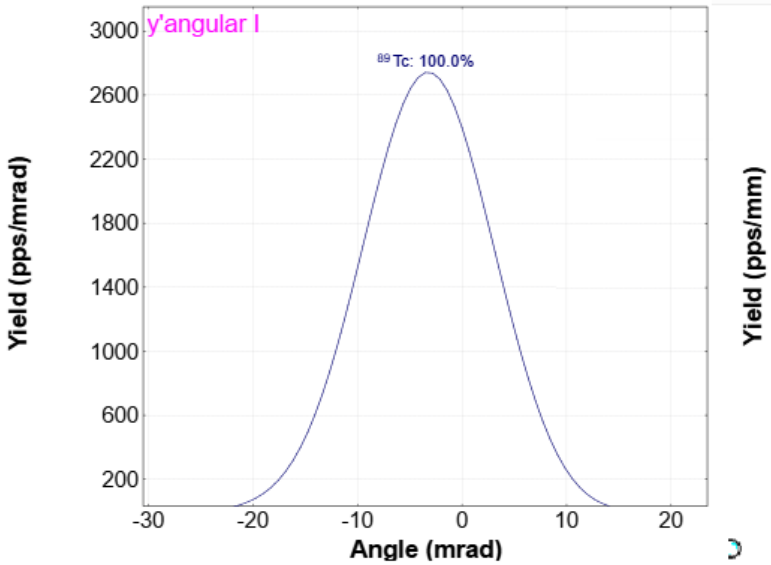
mode="Strong"

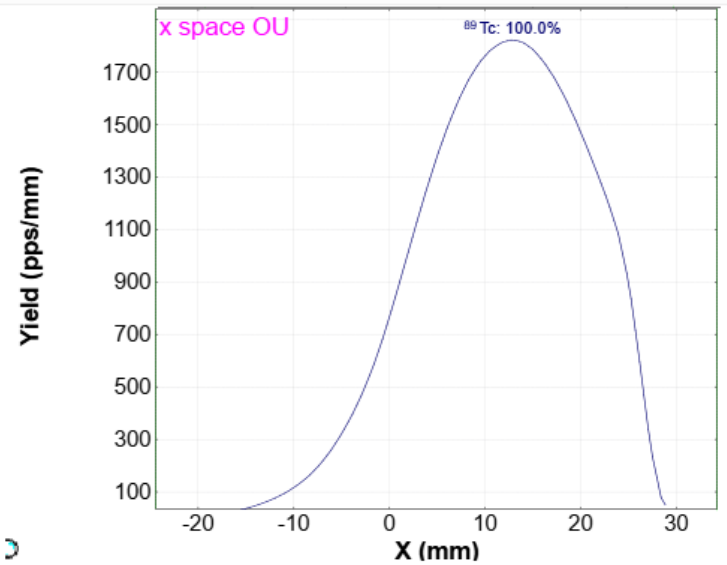
DB2 slits

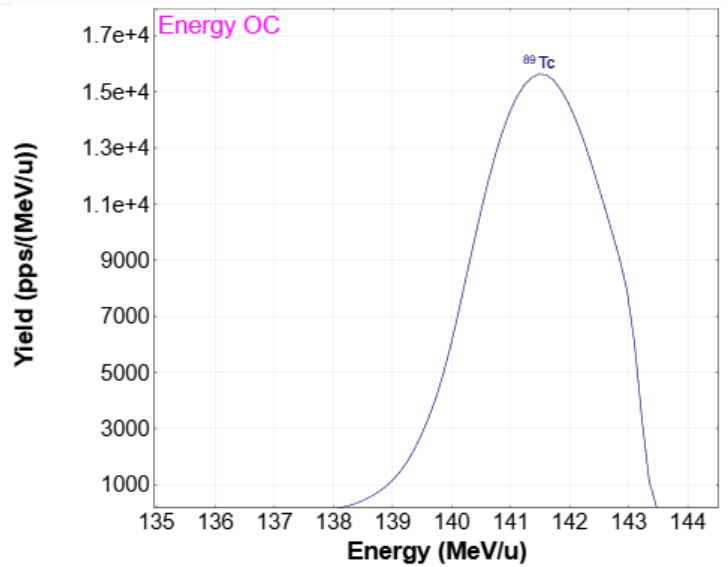
^{124}Xe (227 MeV/u) + C (2.1 mm); Settings on ^{89}Ru; Config: ᶜoDˢ|D|ᵥDD|oD|ᵥD|DDₘₘ|

dp/p=7.81%; Wedge(s): Al_{948} Mg_{44} Mn_5 Fe_2 Si (1.83 mm), 0; Bρ (Tm): 4.1885, 4.1885, 3.6527, 3.6527, 3.6527....

without charge states
all reactions separ.







Monte Carlo