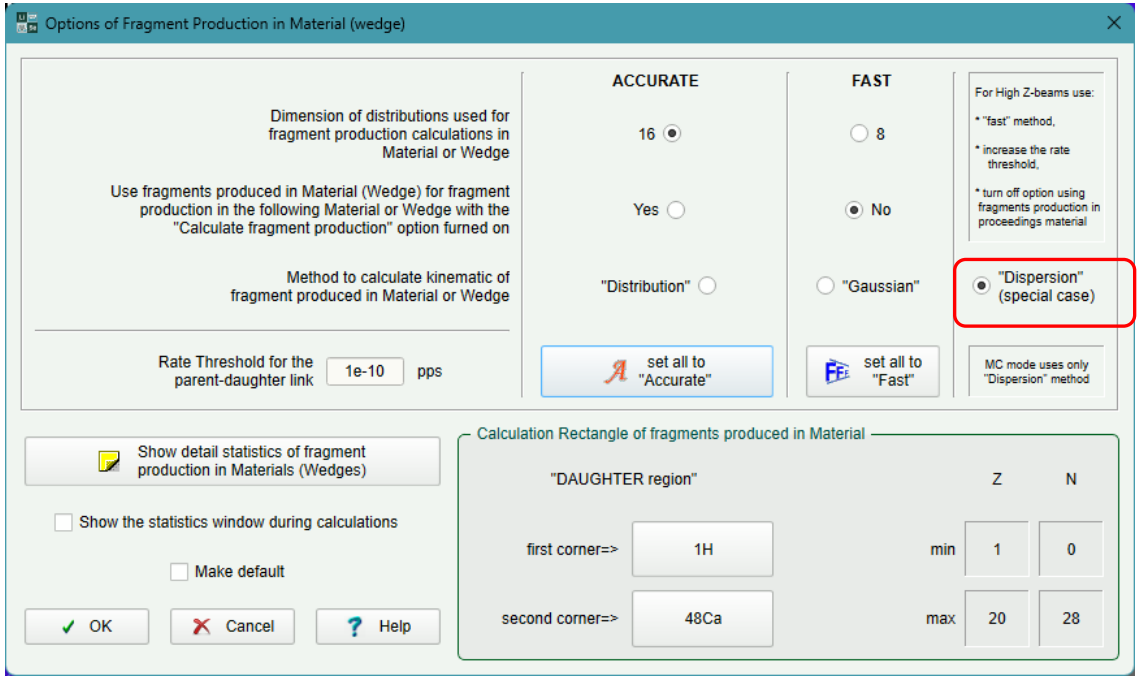
From 04/08/25

- **Secondary target products in Monte Carlo plots**
- **Abrasion-Fission CS plots: plotting user CSs**
- **Plotting Momentum Distribution Characteristics**

  - 3D separator envelope plot updates
  - Stamps in 2D Beam Dump plots
  - Update of Reaction and Title lines in the Beam Dump dialog
  - Unreacted beam value in the Beam Dialog
  - Finger center is shown in setup panel
  - Printing full name in of distribution in plot statistics window
  - Fixing bugs
  - All 17.12.* modifications

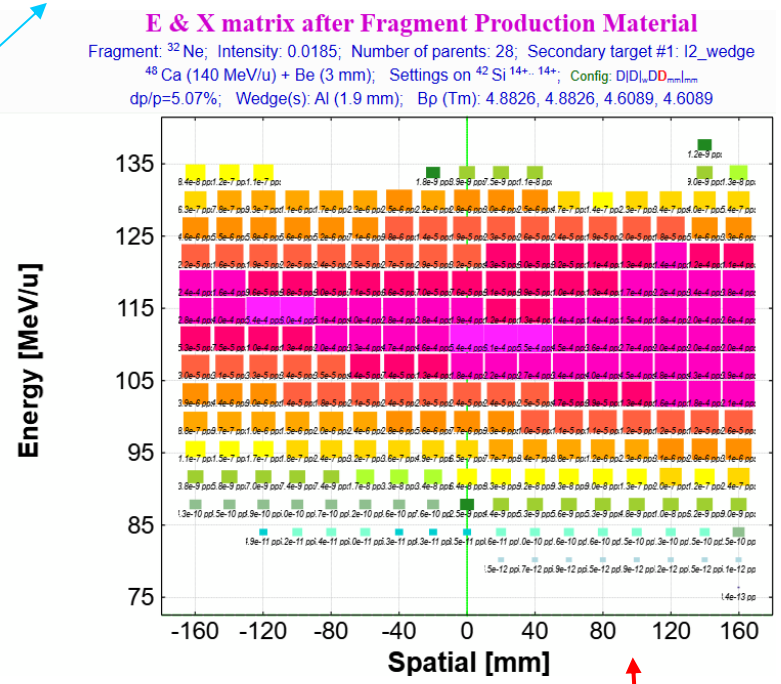
Fragment Production in Materials: Models

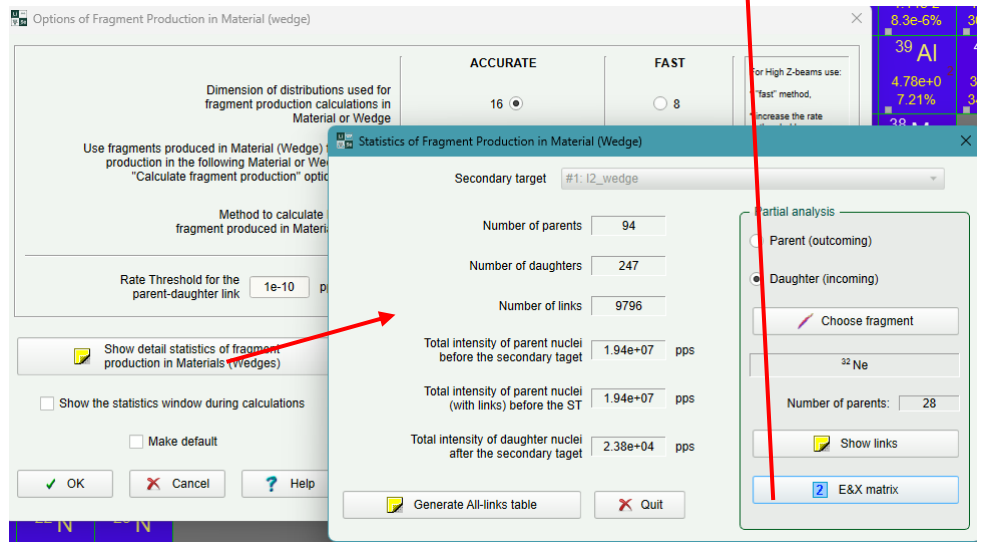


Should be used for MC

Why?

Creation of the E & X correlation matrix used in MC





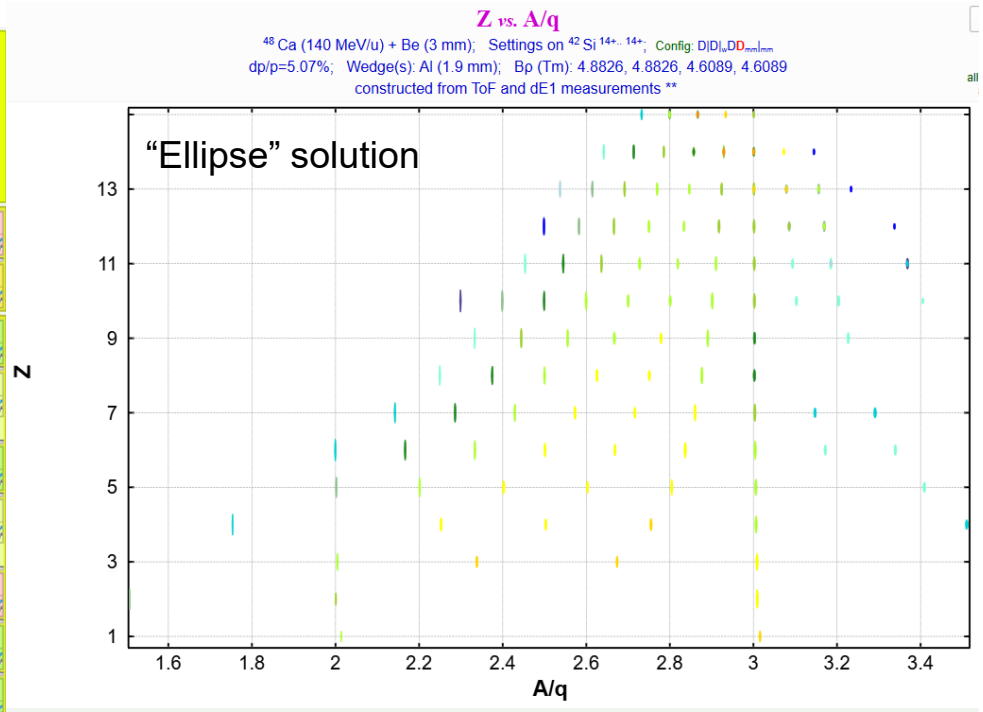
Rate comparison for models of fragment production in materials(secondary targets)

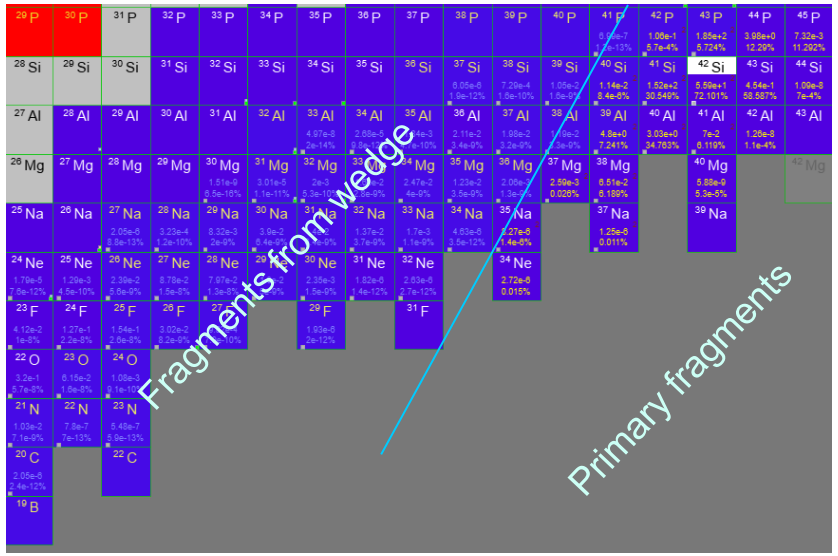
For settings are shown in the next slide
$^{48}Ca+Be \rightarrow {}^{42}Si$

Reactions in Wedge		
model	Total, pps	only Reactions in Wedge
-	4.06E+02	
distrib	4.19E+02	1.36E+01
gauss	4.20E+02	1.38E+01
dispersion	4.23E+02	1.73E+01

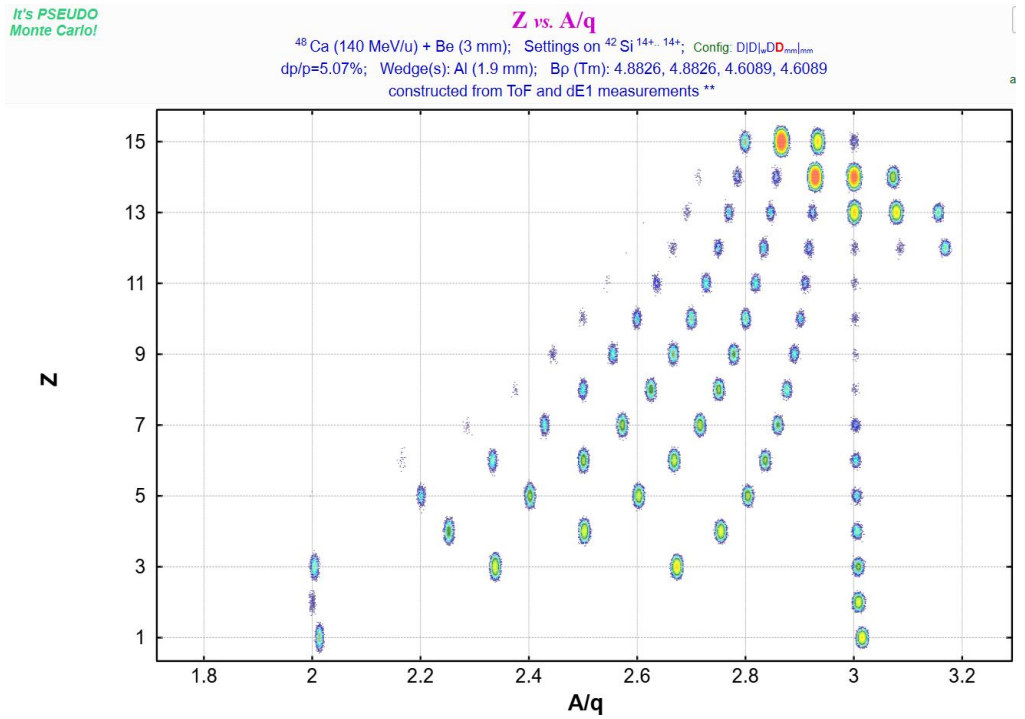
Fragment Production in Materials: “Distribution” plots

Projectile	^{48}Ca $^{20+}$
140 MeV/u	1 kW
Fragment	^{42}Si $^{14+..\ 14+}$
Target	^{9}Be 3 mm
Stripper	
D1	Bρ=4.8826 Tm
I1_slits	slits
-100 H +100	
D2	Bρ=4.8826 Tm
I2_slits	slits
-150 H +150	
I2_wedge	Al 1.9 mm
D3	Bρ=4.6089 Tm
D4	Bρ=4.6089 Tm
FP_PPAC0	Al 2 mg/cm²
FP_PPAC1	Al 2 mg/cm²
FP_slits	slits
-25 H +25 -25 V +25	
FP_PIN	Si 504 µm
FP_SCI	C_9H_{10} 100 mm

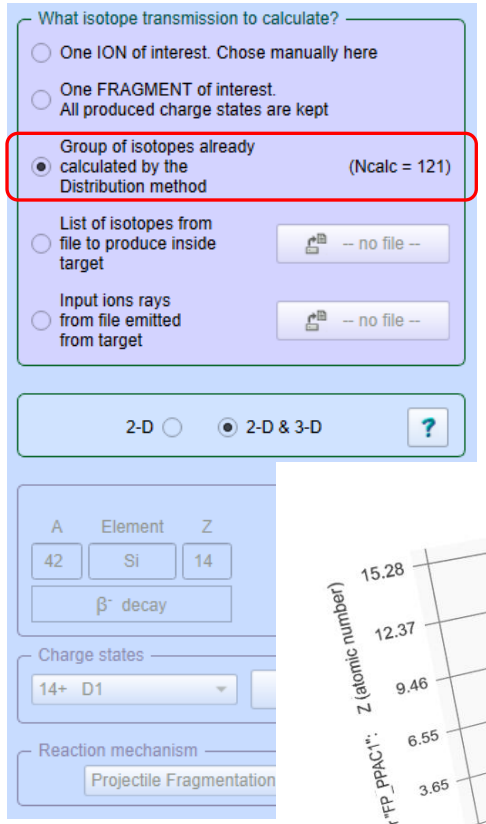


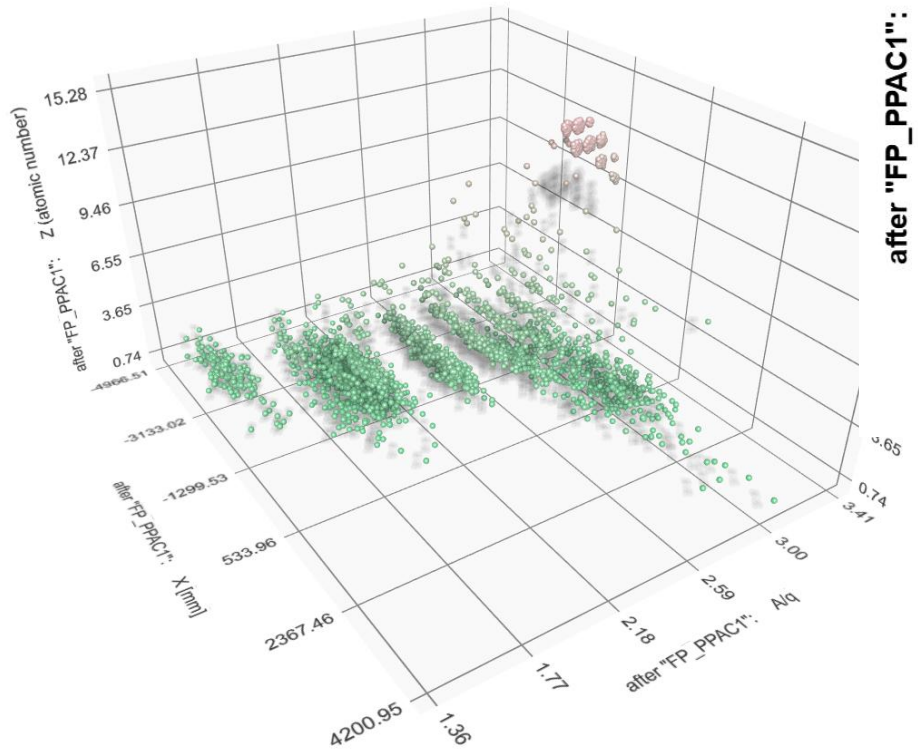


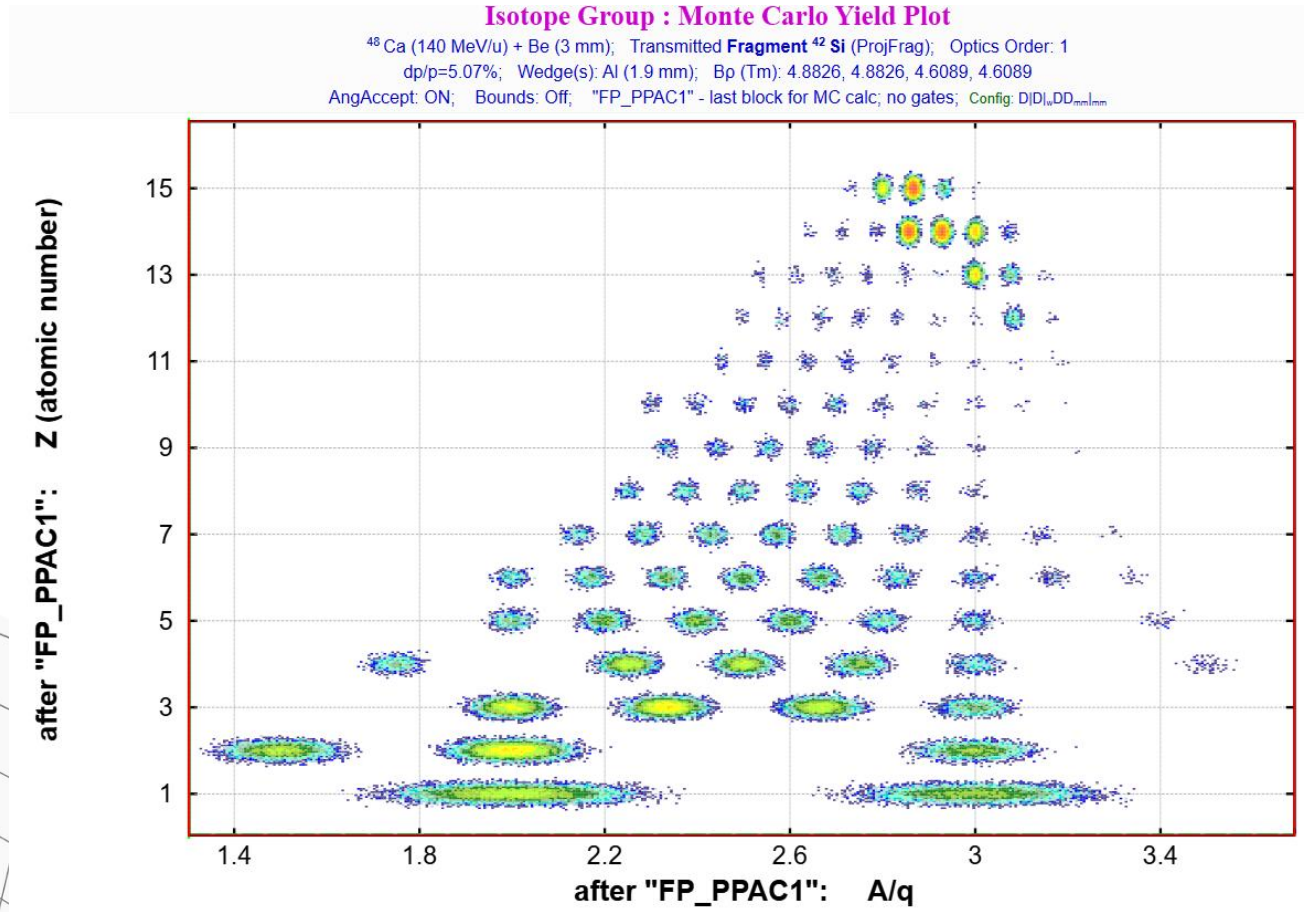
Pseudo Monte Carlo
based on “Distribution” solution



Fragment Production in Materials: Monte Carlo plot







Monte Carlo: plotting only Secondary target products

What isotope transmission to calculate?

- (●) One ION of interest. Chose manually here
- ( ) One FRAGMENT of interest. All produced charge states are kept
- ( ) Group of isotopes already calculated by the Distribution method (Ncalc = 121)
- ( ) List of isotopes from file to produce inside target -- no file --
- ( ) Input ions rays from file emitted from target -- no file --

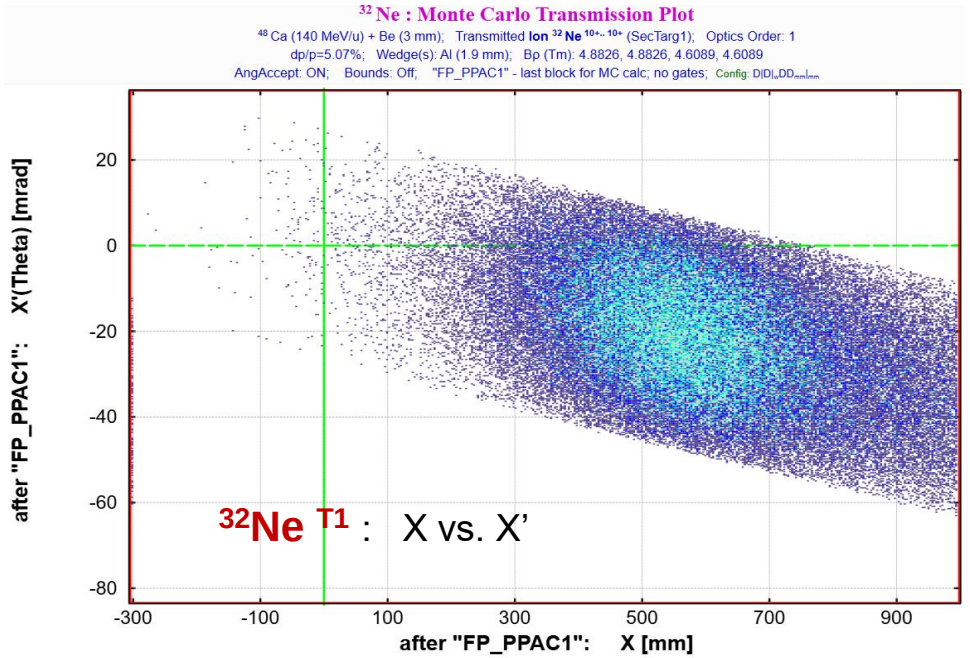
2-D (●) 2-D & 3-D ?

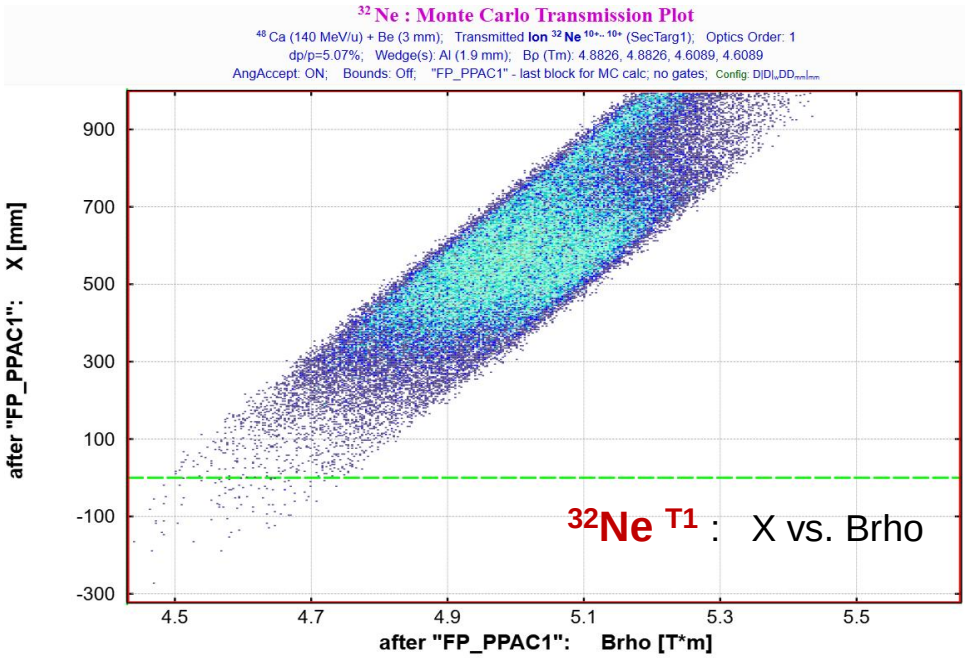
A 32 | Element Ne | Z 10 | Table of Nuclides

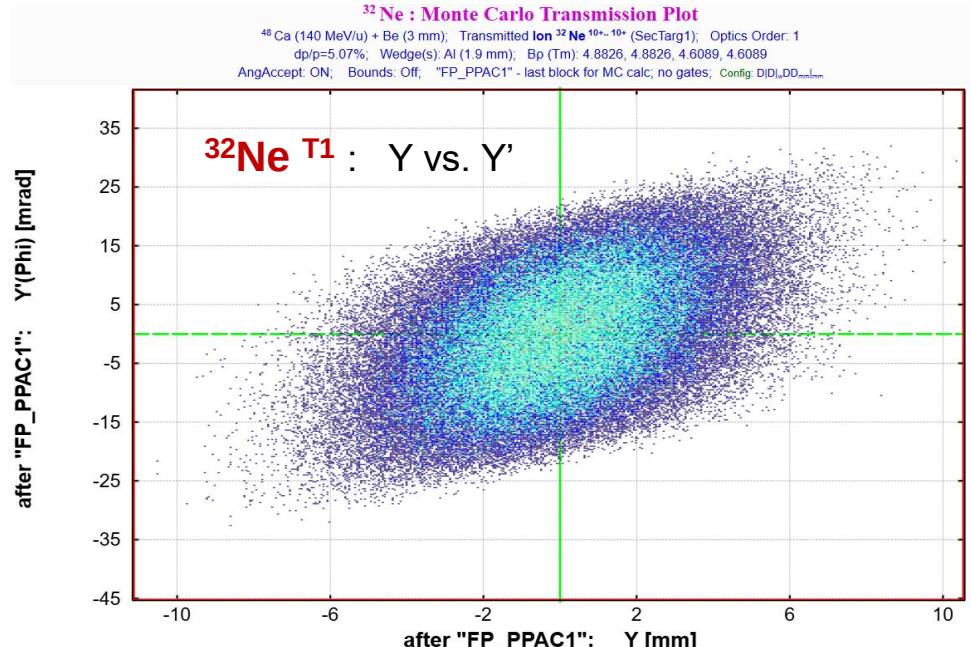
β⁻ decay | Z 10 | N 22

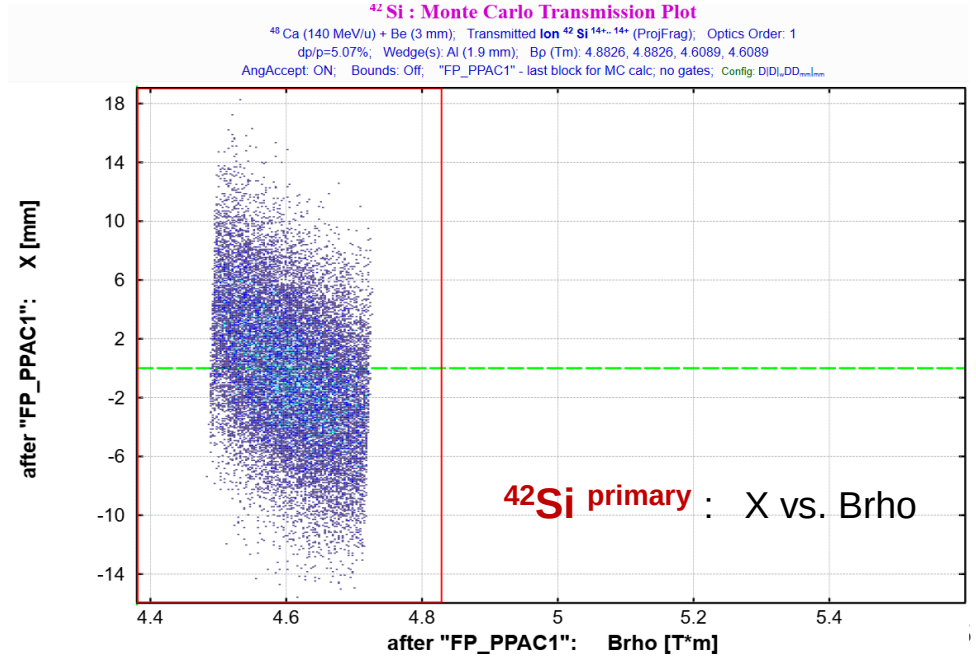
Charge states: 10+ D1 | Set

Reaction mechanism: Secondary Target ~1

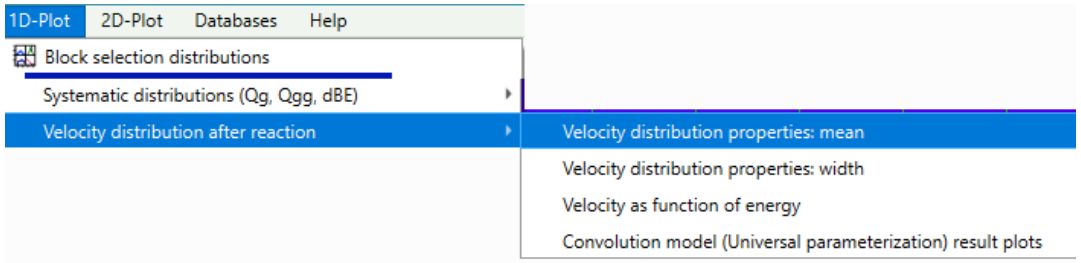


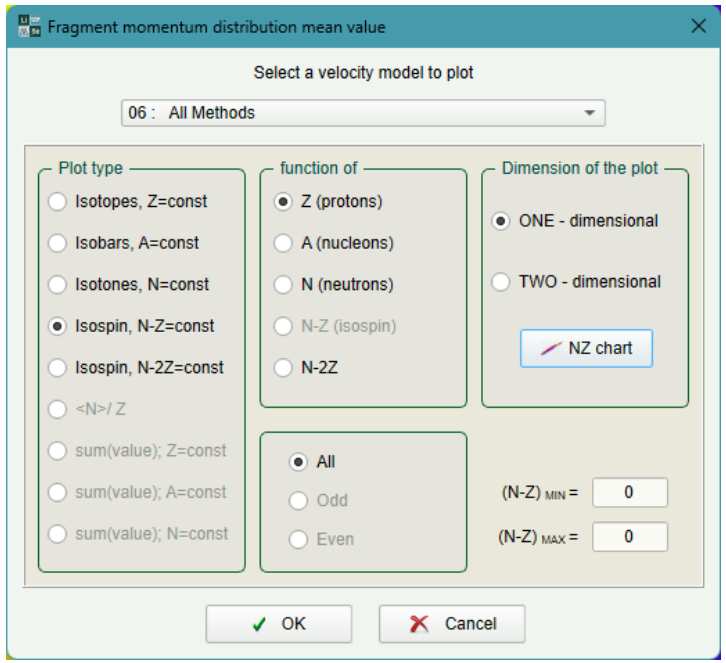


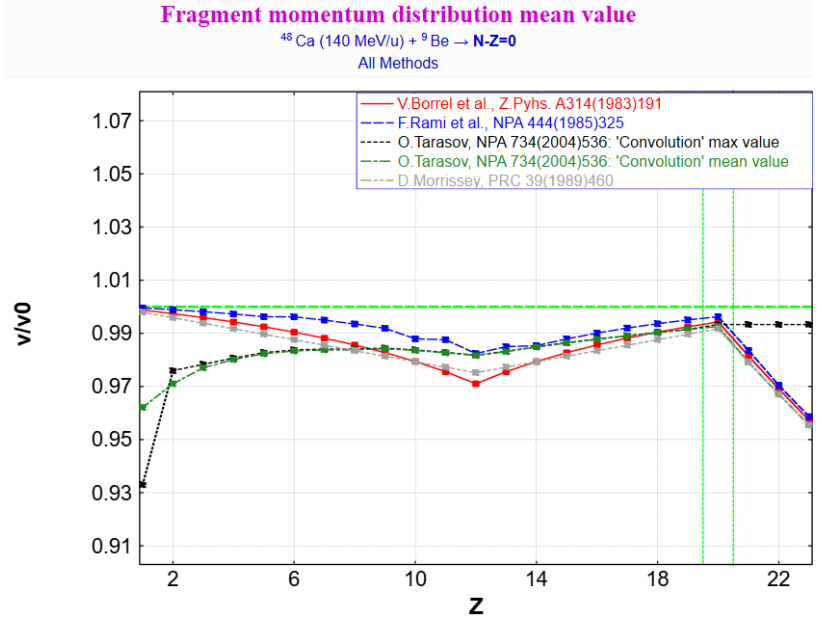


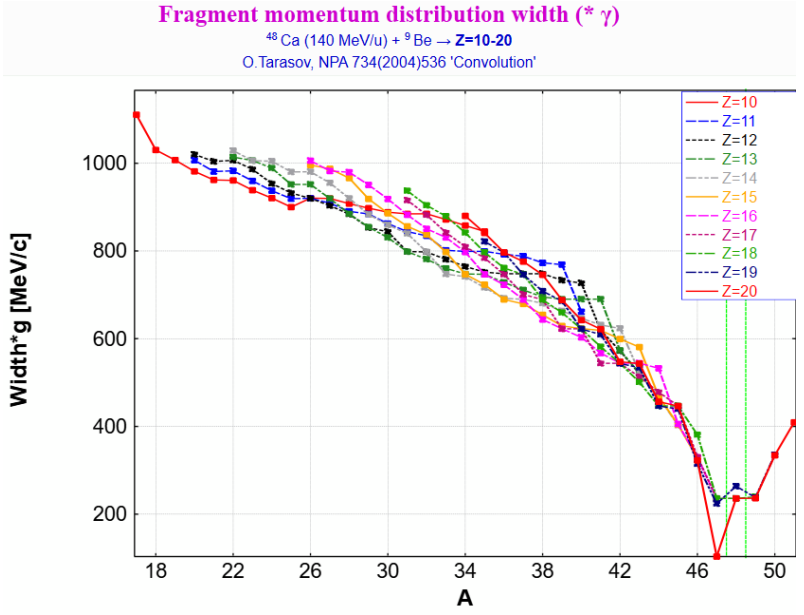


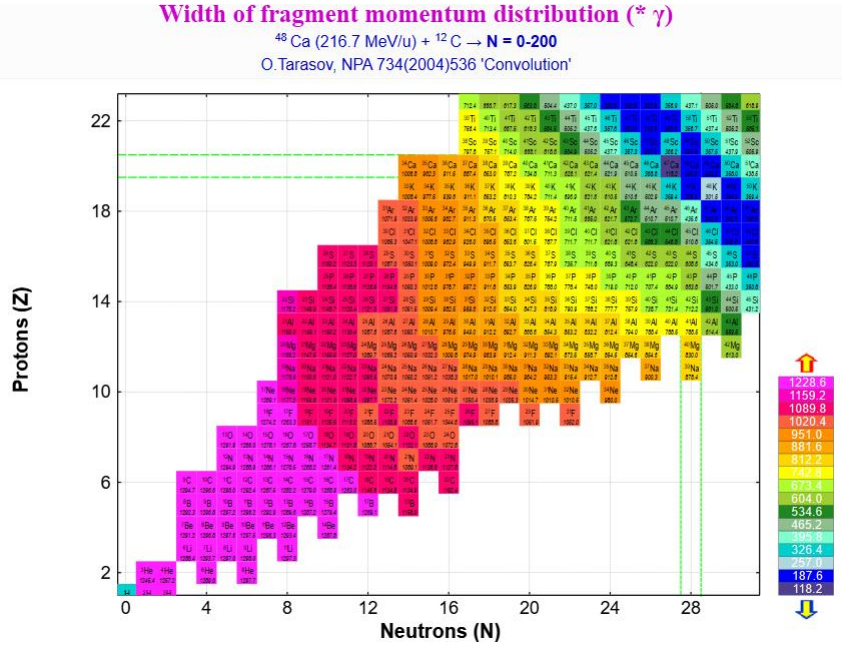
Plotting Momentum Distribution Characteristics



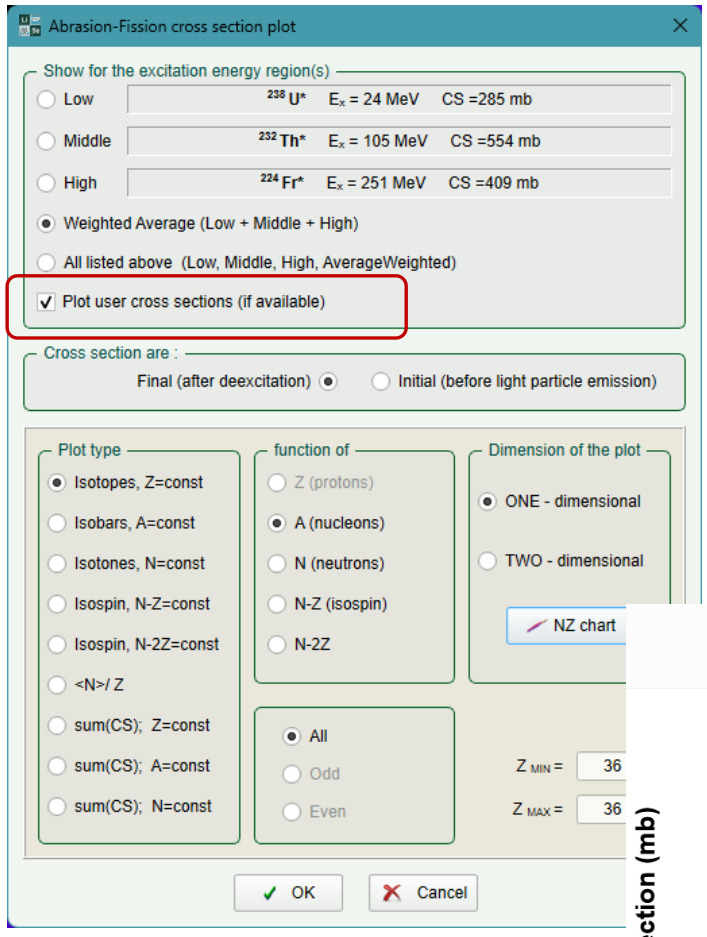


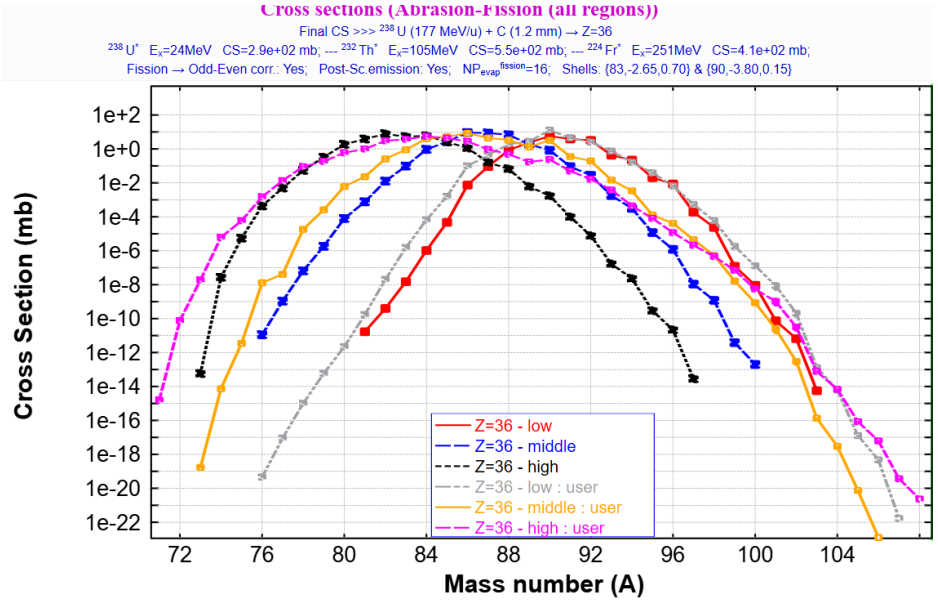




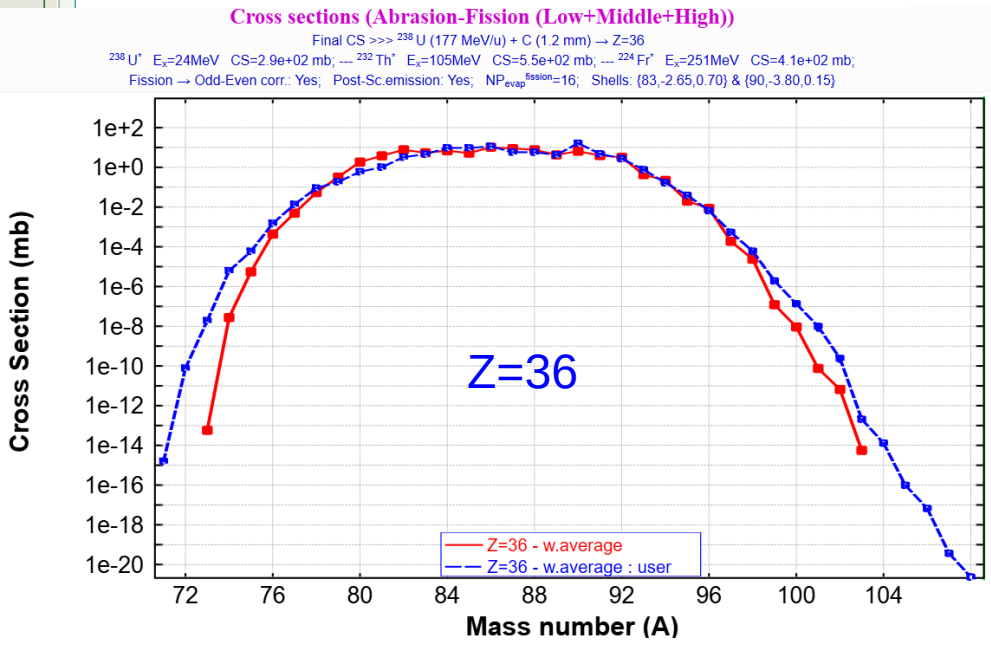


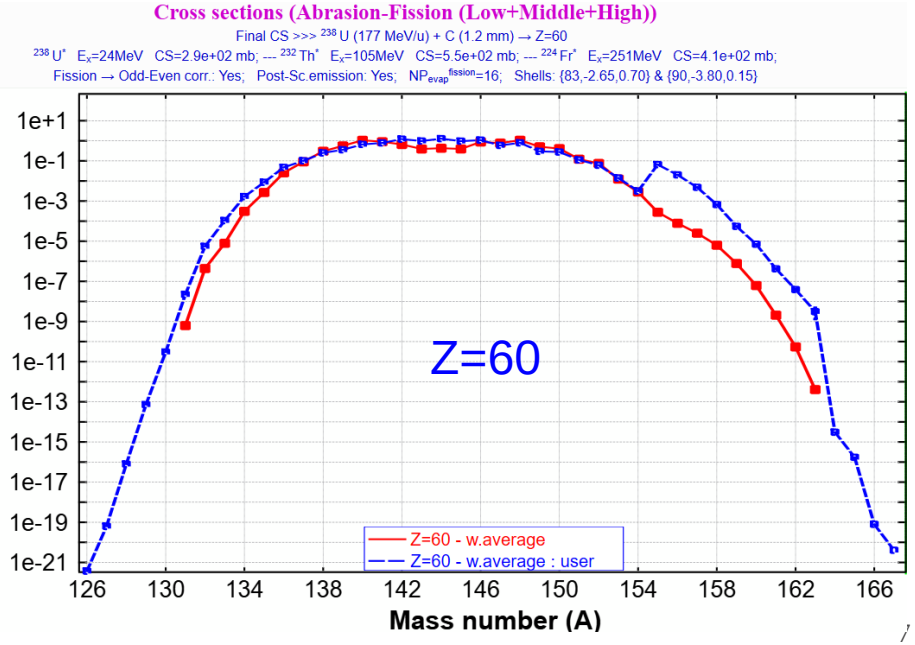
Abrasion-Fission CS plots: plotting user CSs





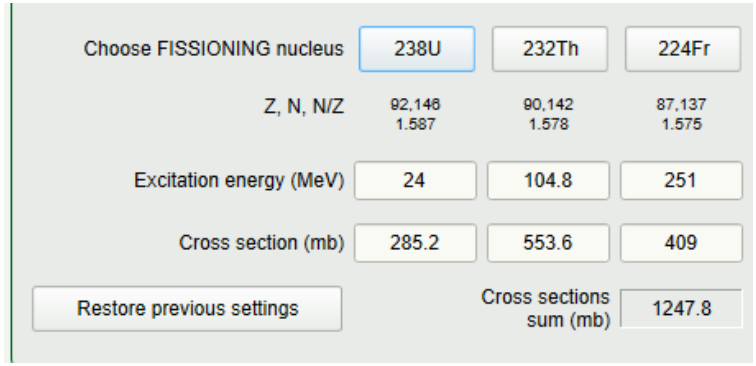
- RIKEN (BigRIPS) CS table has been used
- LISE 3EER settings are given on the next slide

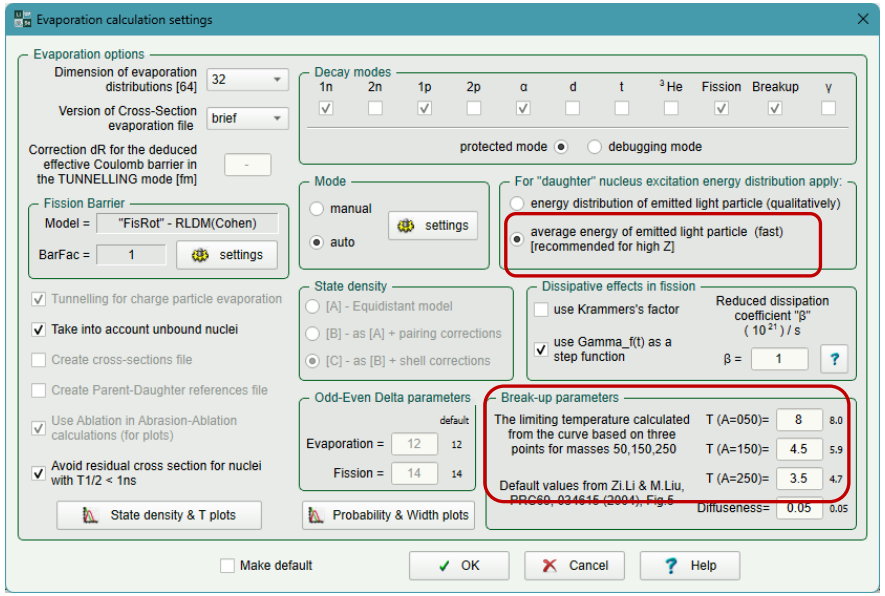


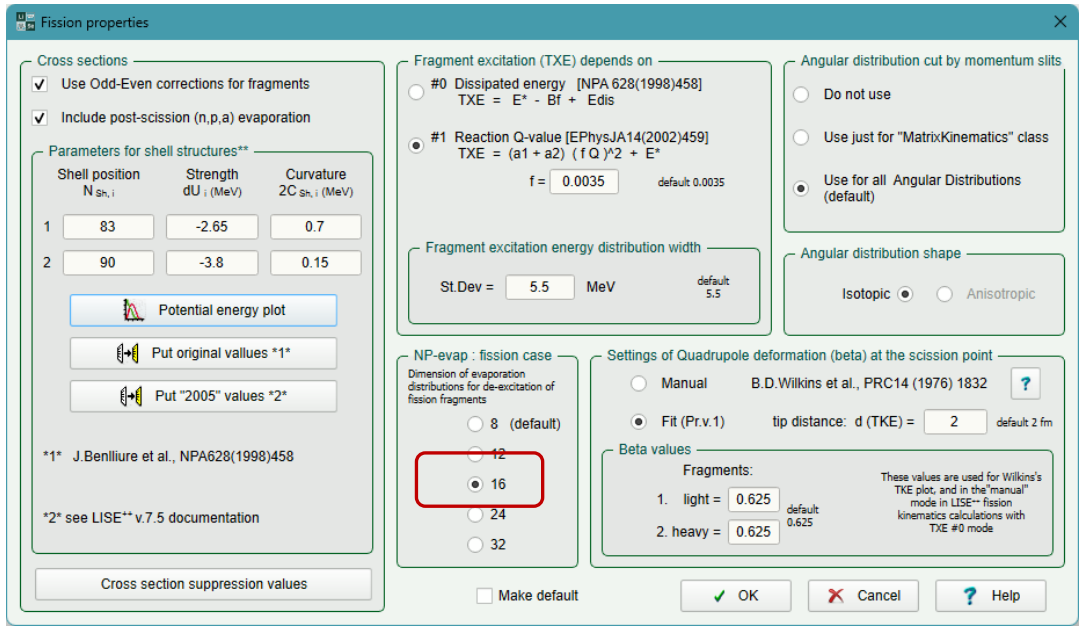


3EER model settings for the previous slide calculations

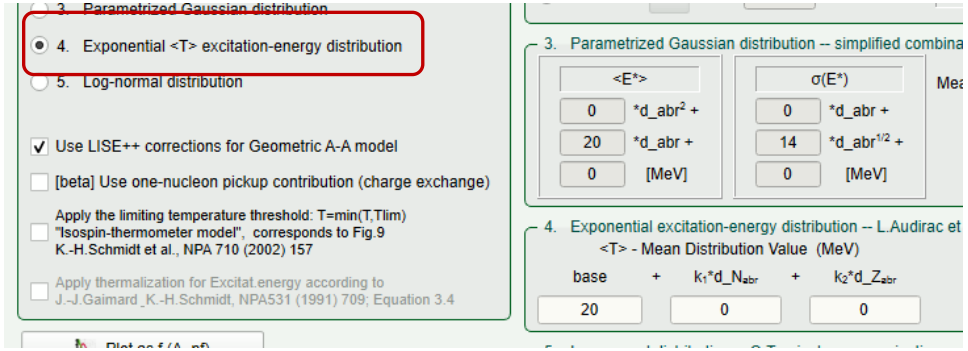
Mass:
WS4_RBF







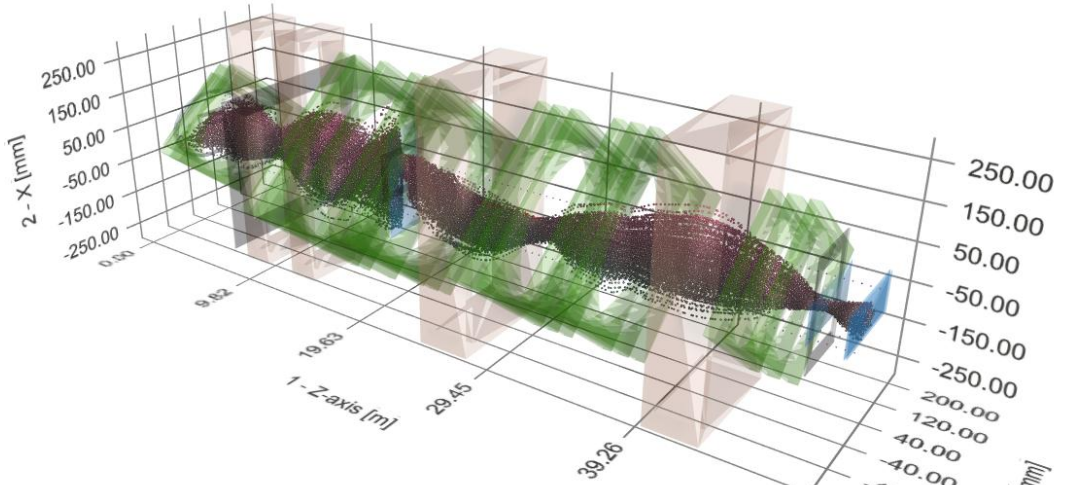
Excitation energy

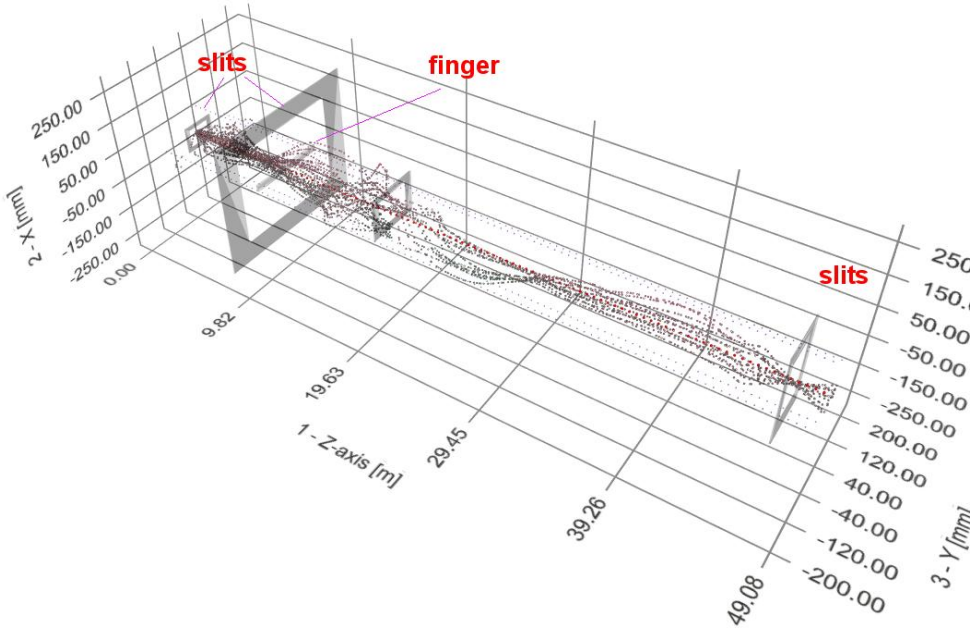


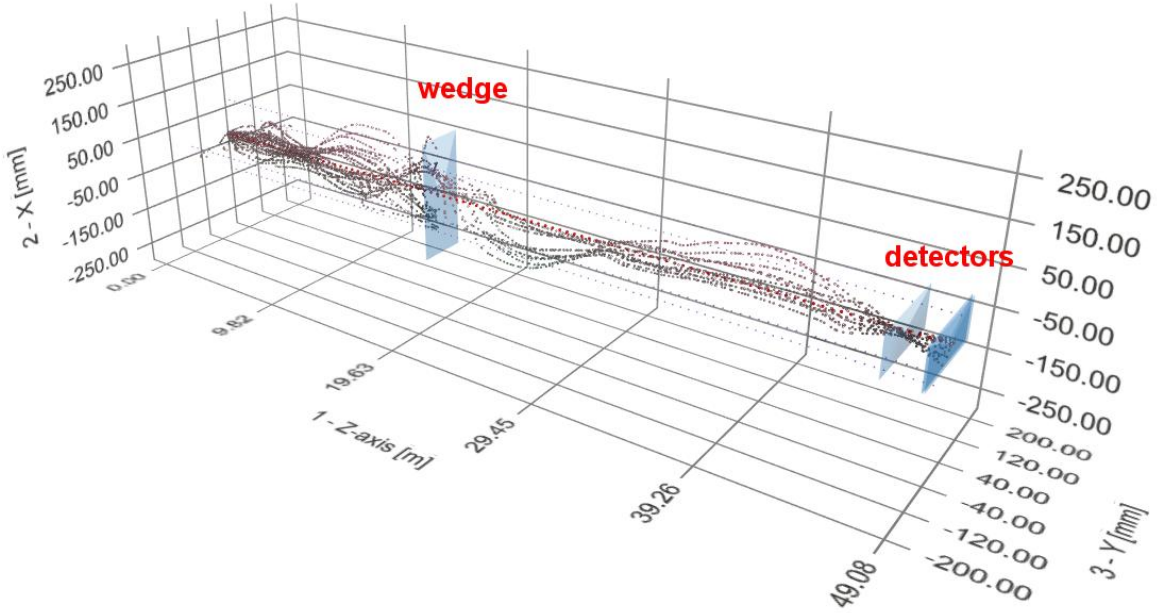
3D separator envelope plot updates

Sasha's contribution is appreciated

17.12.2 02/21/25 3D-graph plot pan
17.12.7 02/28/25 New ARIS 3D blocks
17.12.8 03/16/25 3D Axis rotation
17.12.9 03/16/25 ARIS 3D blocks resize
17.12.14 03/31/25 3D update rotation gadgets - synchronize with mouse rotation
17.12.17 04/01/25 Modification of 3D Sasha's block for correlation slider & manual rotation
17.12.23 04/02/25 Camera Rotation calculation in Q3D





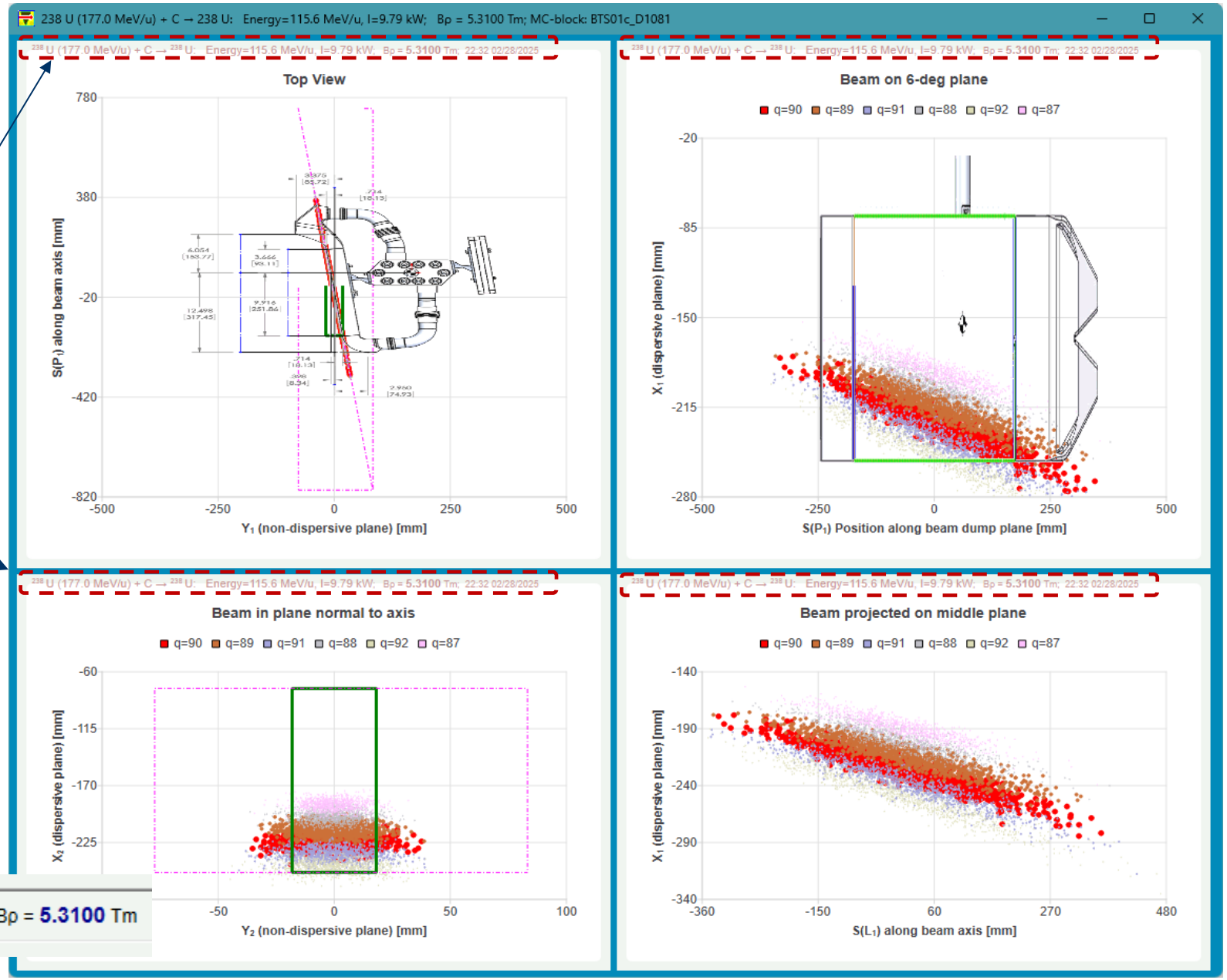


Beam Dump Dialog update

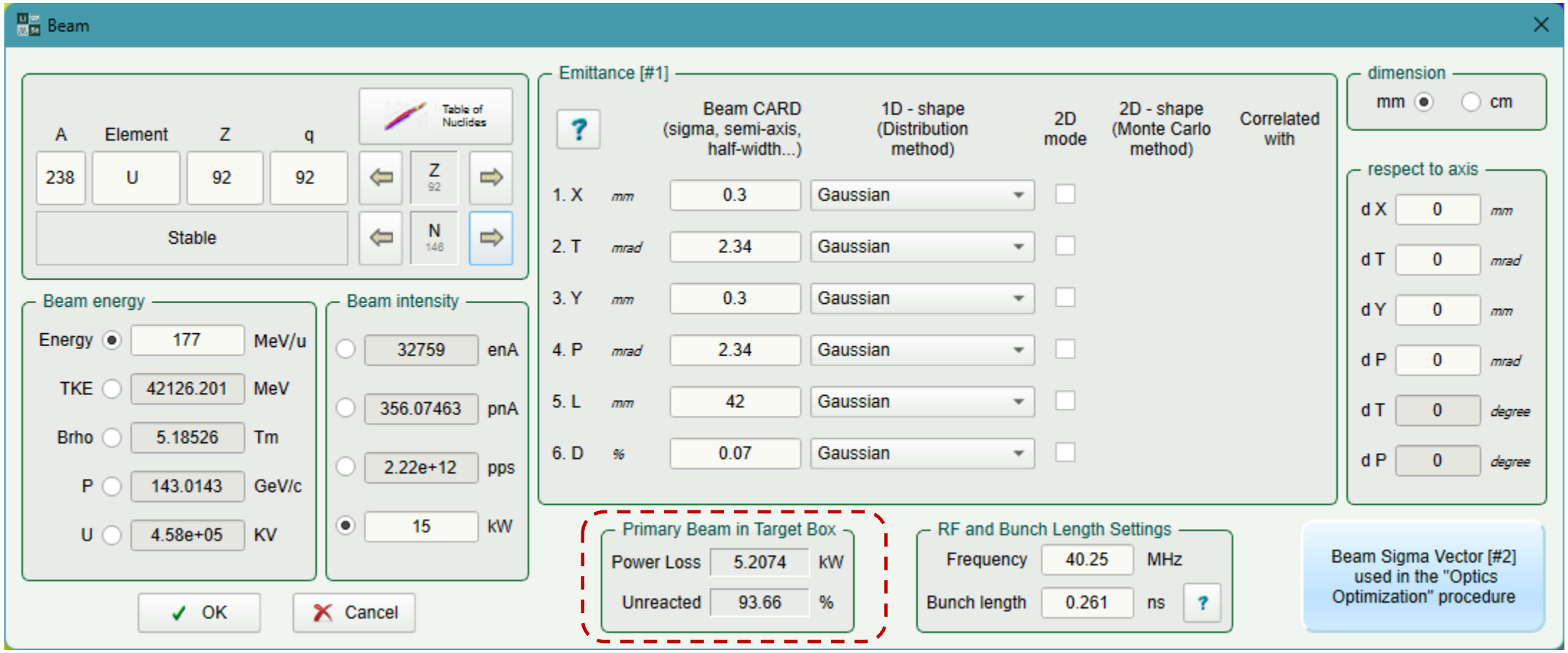
Stamps in 2D Beam Dump plots

Update of Reaction and Title lines in the Beam Dump dialog

^{238}U (177.0 MeV/u) + C → ^{238}U: Energy=115.6 MeV/u, I=9.79 kW; Bρ = **5.3100** Tm



Unreacted beam value in the Beam Dialog



Beam power loss excludes the reacted portion and accounts only for energy loss within the target and stripper

Printing full name in of distribution in plot statistics window

dynamical cell length

Statistics for DB3_slt -> BrhoPlot

Save As | Print | PrintView | Consolas | 9

```
DB3_slt -> BrhoPlot
208Pb (190 MeV/u) + C (3.5 mm);    Settings on 208Pb 80+.. 80+;   Config: doDds|dD|wDD|obD|wDm|mwD|mDm|mm
dp/p=1.76%;    Wedge(s): Al977Mg11 (0.75 mm), 0, 0;    Brho (Tm): 3.5796, 3.5796, 2.5714, 2.5714, 2.5714....
Plot 1;  "input"
```

N	distribution	x-mean	x-mode	y-max	StDeviation	FWHM	area	SumOfCounts	Pfit-xmode	P: -varnc	P: +varnc	Median	M: -varnc	M: +varnc
01	208Pb[beam]80+80+80+80+80+80+80+80+: 100.0%	+2.5553e+00	+2.5551e+00	1.497e+12	4.389e-03	1.062e-02	1.6764e+10	2.571e+13	+2.555e+00	4.209e-03	4.573e-03	+2.555e+00	4.354e-03	4.421e-03
02	208Pb[beam]81+81+82+82+82+82+82+82+: 100.0%	+2.5705e+00	+2.5705e+00	5.978e+04	3.084e-03	7.227e-03	4.6057e+02	9.516e+05	+2.570e+00	3.022e-03	3.148e-03	+2.571e+00	3.068e-03	3.098e-03
03	208Pb[beam]80+80+81+81+81+81+81+81+: 100.0%	+2.5354e+00	+2.5354e+00	5.725e+07	2.537e-03	6.030e-03	3.6630e+05	9.751e+08	+2.535e+00	2.592e-03	2.483e-03	+2.535e+00	2.545e-03	2.527e-03
04	208Pb[beam]80+80+79+79+79+79+79+79+: 100.0%	+2.5749e+00	+2.5751e+00	4.212e+09	2.856e-03	6.781e-03	3.0296e+07	7.145e+10	+2.575e+00	3.064e-03	2.650e-03	+2.575e+00	2.954e-03	2.757e-03
05	208Pb[beam]79+79+78+78+78+78+78+78+: 100.0%	+2.5414e+00	+2.5412e+00	8.281e+07	3.934e-03	9.103e-03	8.0748e+05	1.277e+09	+2.541e+00	3.809e-03	4.045e-03	+2.541e+00	3.634e-03	4.240e-03
06	208Pb[beam]79+79+77+77+77+77+77+77+: 100.0%	+2.5575e+00	+2.5574e+00	4.723e+10	4.923e-03	1.201e-02	5.9556e+08	8.148e+11	+2.557e+00	4.930e-03	4.917e-03	+2.557e+00	4.727e-03	5.123e-03
07	208Pb[beam]79+79+76+76+76+76+76+76+: 100.0%	+2.5761e+00	+2.5762e+00	2.012e+09	2.328e-03	5.569e-03	1.1861e+07	3.360e+10	+2.576e+00	2.439e-03	2.220e-03	+2.576e+00	2.359e-03	2.296e-03
08	208Pb[beam]78+78+75+75+75+75+75+75+: 100.0%	+2.5426e+00	+2.5423e+00	8.167e+04	3.978e-03	9.354e-03	8.1307e+02	1.326e+06	+2.542e+00	3.919e-03	4.035e-03	+2.542e+00	3.796e-03	4.161e-03
09	208Pb[beam]78+78+74+74+74+74+74+74+: 100.0%	+2.5563e+00	+2.5554e+00	1.148e+08	5.452e-03	1.303e-02	1.5847e+06	1.914e+09	+2.555e+00	4.784e-03	6.110e-03	+2.556e+00	5.383e-03	5.511e-03
10	208Pb[beam]78+78+73+73+73+73+73+73+: 100.0%	+2.5738e+00	+2.5737e+00	2.058e+08	2.299e-03	5.577e-03	1.2078e+06	3.431e+09	+2.574e+00	2.162e-03	2.437e-03	+2.574e+00	2.248e-03	2.348e-03
11	208Pb[beam]77+77+72+72+72+72+72+72+: 100.0%	+2.5257e+00	+2.5254e+00	6.216e-02	1.261e-03	3.042e-03	1.9885e-04	1.214e+00	+2.525e+00	1.020e-03	1.490e-03	+2.526e+00	1.171e-03	1.345e-03
12	208Pb[beam]77+77+71+71+71+71+71+71+: 100.0%	+2.5524e+00	+2.5516e+00	4.283e+02	5.781e-03	1.359e-02	6.2033e+00	7.059e+03	+2.552e+00	5.097e-03	6.453e-03	+2.552e+00	5.652e-03	5.897e-03
13	208Pb[beam]77+77+70+70+70+70+70+70+: 100.0%	+2.5661e+00	+2.5655e+00	1.546e+05	4.387e-03	1.070e-02	1.7367e+03	2.759e+06	+2.565e+00	3.897e-03	4.872e-03	+2.566e+00	4.336e-03	4.431e-03
14	208Pb[beam]76+76+67+67+67+67+67+67+: 100.0%	+2.5523e+00	+2.5522e+00	3.502e-03	3.371e-03	7.976e-03	2.9674e-05	5.720e-02	+2.552e+00	3.199e-03	3.546e-03	+2.552e+00	3.304e-03	3.436e-03
15	206T179+79+79+79+79+79+79+79+: 100.0%	+2.5580e+00	+2.5579e+00	1.650e+08	4.396e-03	1.061e-02	1.8470e+06	2.729e+09	+2.558e+00	4.234e-03	4.565e-03	+2.558e+00	4.295e-03	4.500e-03
16	207T179+79+78+78+78+78+78+78+: 100.0%	+2.5676e+00	+2.5678e+00	9.635e+07	4.555e-03	1.111e-02	1.1244e+06	1.697e+09	+2.568e+00	4.770e-03	4.346e-03	+2.568e+00	4.674e-03	4.438e-03
17	207T178+78+75+75+75+75+75+75+: 100.0%	+2.5678e+00	+2.5674e+00	9.401e+06	4.688e-03	1.146e-02	1.1315e+05	1.682e+08	+2.567e+00	4.307e-03	5.070e-03	+2.568e+00	4.624e-03	4.746e-03
18	206T178+78+76+76+76+76+76+76+: 100.0%	+2.5600e+00	+2.5599e+00	4.219e+06	4.914e-03	1.196e-02	5.3050e+04	6.985e+07	+2.560e+00	4.956e-03	4.874e-03	+2.560e+00	4.961e-03	4.869e-03
19	207T179+79+79+79+79+79+79+79+: 100.0%	+2.5491e+00	+2.5485e+00	3.649e+06	4.085e-03	9.668e-03	3.7511e+04	5.785e+07	+2.549e+00	3.650e-03	4.516e-03	+2.549e+00	4.026e-03	4.136e-03
20	206T179+79+78+78+78+78+78+78+: 100.0%	+2.5794e+00	+2.5793e+00	2.272e+05	1.852e-03	4.418e-03	1.0641e+03	3.574e+06	+2.579e+00	1.760e-03	1.946e-03	+2.579e+00	1.839e-03	1.864e-03
21	207T178+78+76+76+76+76+76+76+: 100.0%	+2.5518e+00	+2.5517e+00	2.077e+04	4.751e-03	1.117e-02	2.4719e+02	3.239e+05	+2.552e+00	4.697e-03	4.798e-03	+2.552e+00	4.433e-03	5.084e-03
22	207T177+77+72+72+72+72+72+72+: 100.0%	+2.5639e+00	+2.5635e+00	1.760e+04	5.329e-03	1.280e-02	2.3775e+02	3.072e+05	+2.563e+00	5.118e-03	5.526e-03	+2.564e+00	5.059e-03	5.592e-03

Improvement, fixing bugs

Fixing bugs, corrections:

17.12.1 02/20/25 lise.xlsm modified to do not use kernel functions

17.12.11 03/16/25 BeamDump : no gates in MC close MC_gate[i], update MC diaolg if open

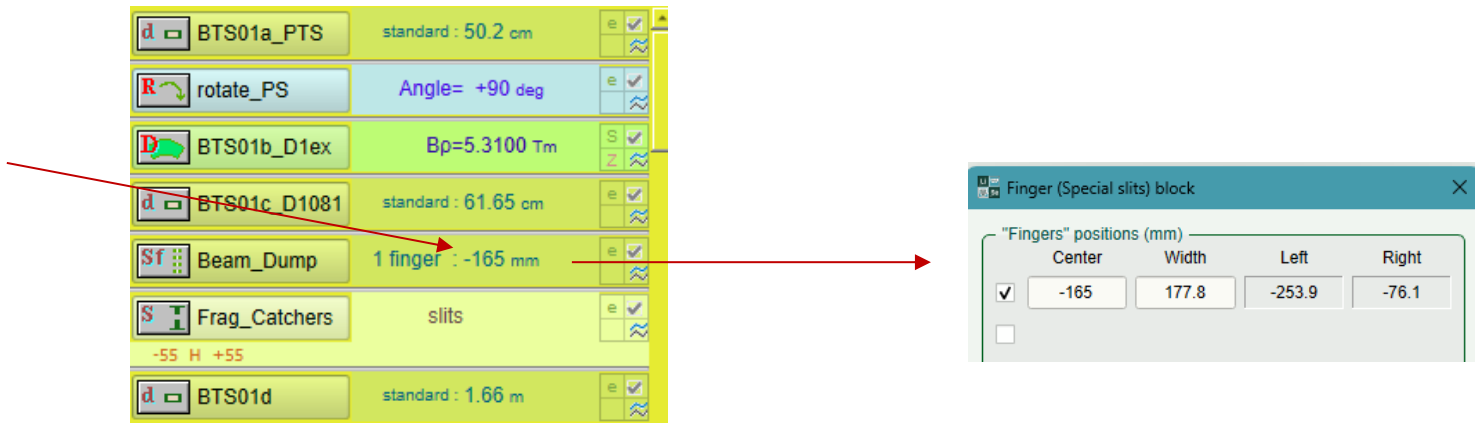
17.12.12 03/27/25 Fixed bug: zero angular distribution in material after drift in fission case

17.12.15 04/01/25 Fixed bug in SecReact Kineamtics

17.12.27 04/04/25 Modifications in d_PlotCS2_CS -- no repeating slots and signals

17.12.30 04/05/25 Correction in d_FissionEM_* dialogs for signals and slots isotopes

Finger center is shown in the setup panel



v.17.13 – All modifications

17.12.1 02/20/25 lise.xlsm modified to do not use kernel functions

17.12.2 02/21/25 3D-graph plot pan

17.12.3 02/25/25 Finger center is shown in setup

17.12.4 02/28/25 Update of Reaction and Title lines in the Beam Dump dialog

17.12.5 02/28/25 Stamps in 2D Beam Dump plots

17.12.6 02/28/25 Unreacted beam value in the Beam dialog (DJM)

17.12.7 02/28/25 New ARIS 3D blocks

17.12.8 03/16/25 3D Axis rotation

17.12.9 03/16/25 ARIS 3D blocks resize

17.12.10 03/16/25 new --> void TCN_MC_Dlg:noGates()

17.12.11 03/16/25 BeamDump : no gates in MC
close MC_gate[i], update MC dls if open

17.12.12 03/27/25 bug: zero anglular distribution in material after drift in fission case

17.12.13 03/31/25 3D ARIS blocks renewal (Sasha)

17.12.14 03/31/25 3D update rotation gadgets - synchronize with mouse rotation (Sasha)

17.12.15 04/01/25 Fixed bug in SecReact Kineamtics

17.12.16 04/01/25 Revision in virtual/override in Distribution and Distribution2

17.12.17 04/01/25 Modification of 3D Sasha's block for correaltion slider & manual rotation

17.12.18 04/02/25 AF CS dialog : plot user CS

17.12.19 04/02/25 AF CS plot dialog : plot user CS checkbox

17.12.20 04/02/25 CmPlotCS_AF separation from CmPlotCS

17.12.21 04/02/25 splitting file w_Graph_CS to w_Graph_CS, w_Graph_CS_fusion, w_Graph_CS_AF, w_Graph_trans

17.12.22 04/02/25 cleaning w_Graph_CS from AF

17.12.23 04/02/25 Camera Rotation calcualtion in Q3D

17.12.24 04/02/25 Running w_Graph_CS_AF

17.12.25 04/04/25 Printing full name in of distribution in plot statistics window

17.12.26 04/04/25 1st part (Z to N-2Z) of w_Graph_CS_AF completed

17.12.27 04/04/25 modifications in d_PlotCS2_CS -- no repeating slots and signals

17.12.28 04/04/25 modifications in d_AbrFission_plot for RBdim

17.12.29 04/04/25 2nd part (N/Z) of w_Graph_CS_AF completed

17.12.30 04/05/25 correction in d_FissionEM_* dialogs for signals and slots

17.12.31 04/05/25 Creation of submenu menuVelocity_distribution_after_reaction with three components

17.12.32 04/05/25 Fragmentation velocity results plot dialog

17.12.33 04/05/25 Dialogs optimization: merging Fragmentation velocity and Convolution results plot

17.12.34 04/05/25 new file w_Graph_vv0.cpp
new function void MainWindow::CmPlotMomentumDistribution(int dialog)

17.12.35 04/06/25 Completed: Momentum distribution statistic plots

17.12.36 04/07/25 Update d_MC_Plot for secondary targets

17.12.37 04/07/25 o_Second.h : modification for std::unique_ptr
splitting o_Second.cpp to 3 files

17.12.38 04/07/25 creation L_Element/secondTarget, moving o_Second* files in this folder
o_Second* revision

17.12.39 04/08/25 Secondary Target in MC : completed
tested modes: ion, fragment, group of isotopes