

v.17.2
02/26/24

Updated v.17.4
03/27/24

Set the wedge position shift to 0

PS_wdg <> F1S1:WED_D1184

Al₉₃₉ Zn₂₅ Mg₂₉

Density 2.81 g/cm³

State of Matter: Solid Gas

Dimension: mg/cm² & micron g/cm² & mm

Z	Element	Mass	Stoich
<input checked="" type="checkbox"/>	13 Al	26.982	939
<input checked="" type="checkbox"/>	30 Zn	65.39	25
<input checked="" type="checkbox"/>	12 Mg	24.305	29

Thickness (original): 1.49 mm 0.41869 g/cm²

Thickness at X=0 mm: 1.49 mm 0.4187 g/cm²

Wedge horizontal position shift: Shift (mm) = 0

Bound Position - thickness: -75 coordinate, mm; 2.36 thickness, mm; +75 0.69

Degrader profile: Wedge profile Angle (mrad) -11.143; Homogeneous; Curved profile no current profile!; Custom shape = internal profile =

Calculate the Wedge **thickness**** from Previous & Next optical blocks for the setting fragment

Calculate the Wedge **position shift**** from Previous & Next optical blocks for the setting fragment

“Original” thickness: it is used for angle or profile shape calculations

Thickness corresponding to user position shift

Important: Wedge shift direction in LISE is opposite to a shift in the Fragment-Separator system.

If the wedge position shift set

ShiftExists if $\text{abs}(\text{Shift}) > 0.1 \text{ mm}$

This "Calculate" button and the Degradar profile frame are disable if ShiftExists

Wedge Thickness color in the setup window gets red-based color if ShiftExists

The "Thickness at **" frame get green color if ShiftExists

PS_wdg <-> F1S1:WED_D1184

Al₉₃₉Zn₂₅Mg₂₉

Density: 2.81 g/cm³

State of Matter: Solid Gas

Dimension: mg/cm² & micron g/cm² & mm

Thickness (original): 1.49 mm 0.41869 g/cm²

Thickness at X=10 mm: 1.3791 mm 0.3875 g/cm²

Atoms / cm²: 9.05e+21

d/Range (frag): 0.12

Wedge horizontal position shift: Shift (mm) = 10 | Calculate shift**

Bound Position - thickness: -75 coordinate, mm | +75 | 2.36 thickness, mm | 0.69

Degradar profile: Wedge profile Angle (mrad) -11.143 | Calculate angle | Homogeneous | Curved profile no current profile! | Curved profile dialog | Custom shape = internal profile = | Custom shape dialog

Optical Matrix: Matrix element (6,6) or d/d: 0.33

OK Cancel

Beam_Dump 1 finger : 177.8 mm

Frag_Catchers slits

BTS01e_WDG Bp=5.0144 Tm

PS_Mom_slits slits

PS_wdg Al₉₃₉Zn₂₅Mg 1.379 mm

BTS02 Bp=4.8181 Tm

BTS03 Bp=4.8181 Tm

PS_FP_slit slits

Calculate position shift

For example: the wedge has been calculated for ^{44}S , and separator has been set for ^{44}S . But you would like to keep optics settings (B ρ -s), but optimize the current wedge for ^{43}S production. Change FOI to ^{43}S , then calculate a position shift. **Result -6.306 mm.**

Therefore, you have to shift the wedge on +6.306 mm to get ^{43}S at PS_FP_x=0

PS_wdg <-> F1S1:WED_D1184

Al₃₃₀ Zn₂₅ Mg₂₉

Density: 2.81 g/cm³

State of Matter: Solid

Dimension: g/cm² & mm

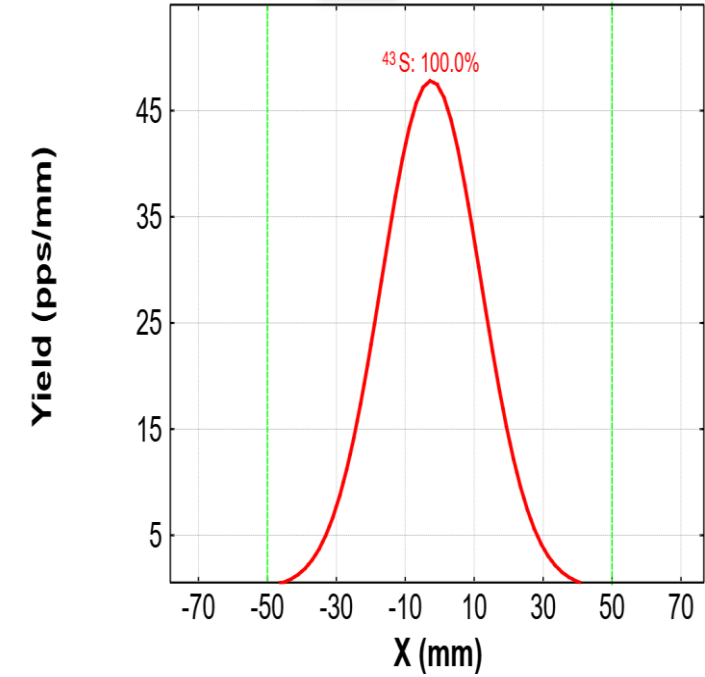
Wedge horizontal position shift
Shift (mm) = -6.306 **Calculate shift****

Bound Position - thickness
-75 coordinate, mm +75
2.36 thickness, mm 0.69

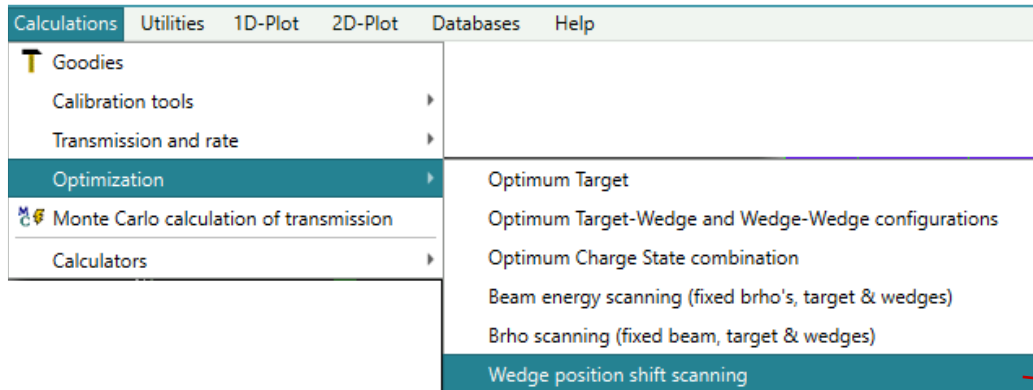
Degrader profile: Wedge profile Angle (mrad) -11.143

Optical Matrix: Matrix element (6,6) or d/d: 0.33

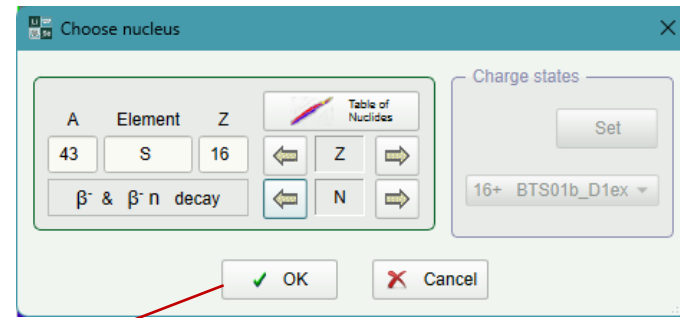
PS_FP_slit → Xspace: output before slits
 ^{44}Ca (197.8 MeV/u) + C (8 mm); Settings: ^{43}S ...
dp(p)=4.41%; Wedge(s): Al₃₃₀Zn₂₅Mg₂₉ (1.49 mm), Al₃₃₀Zn₂₅Mg₂₉ (Saved to this PC) (Tm): 5.0144, 5.0144, 4.8181, 4.8181, 4.8181...
without charge states all reactions separ.



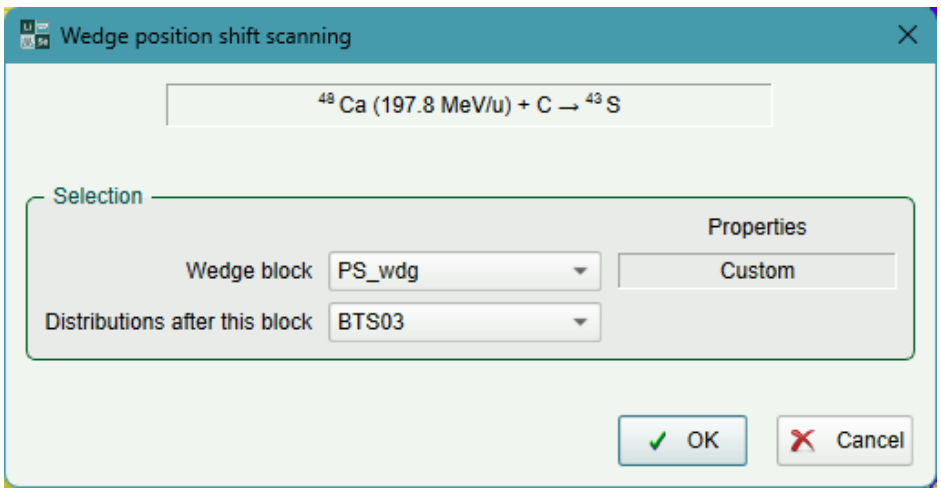
Calculate the Wedge **position shift**** from Previous & Next optical blocks for the setting fragment



Choose nucleus.
For example: ^{43}S ,
Thought FOI is ^{44}S



Then Choose wedge and
destination blocks

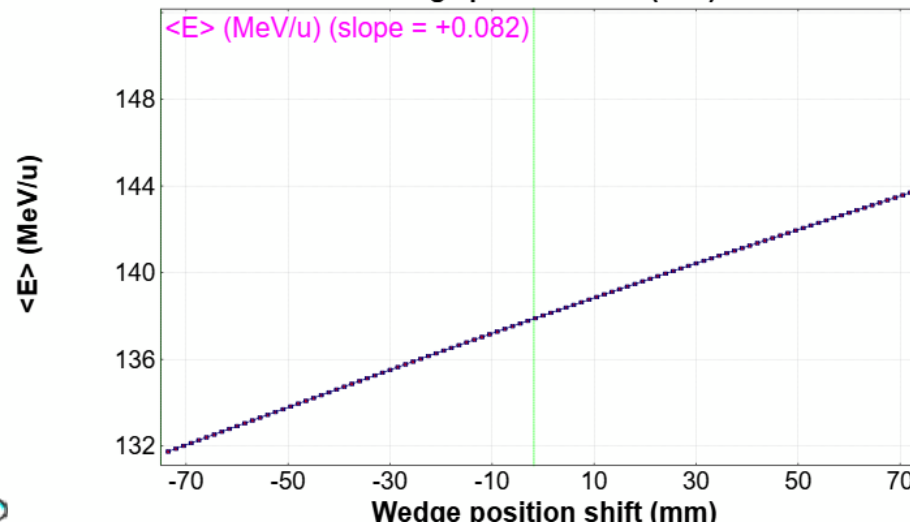
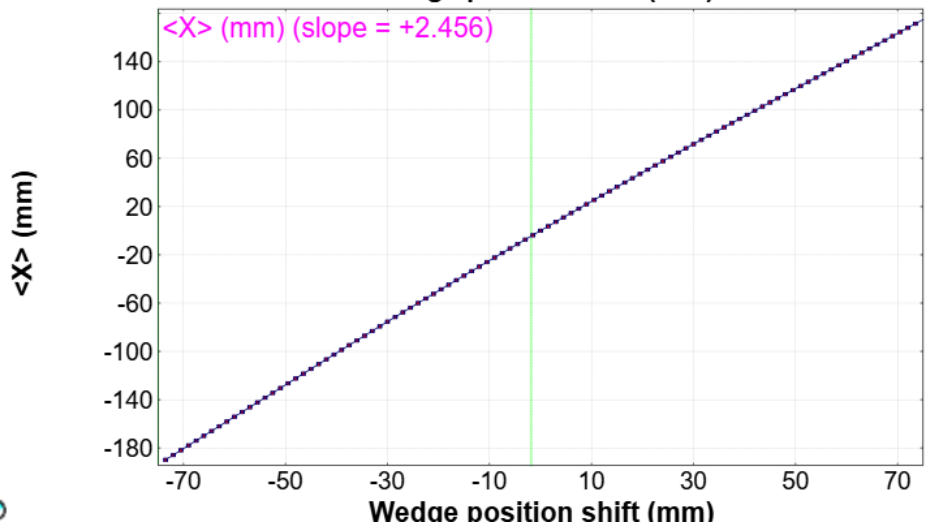
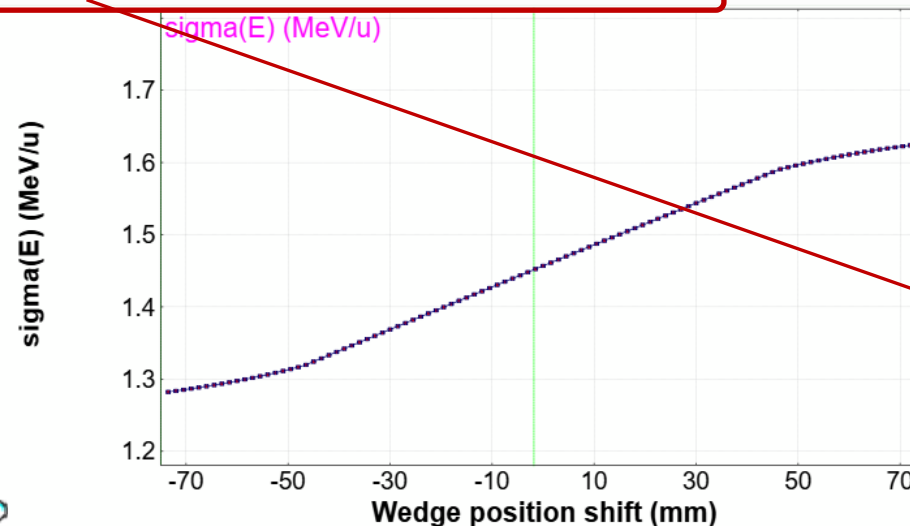
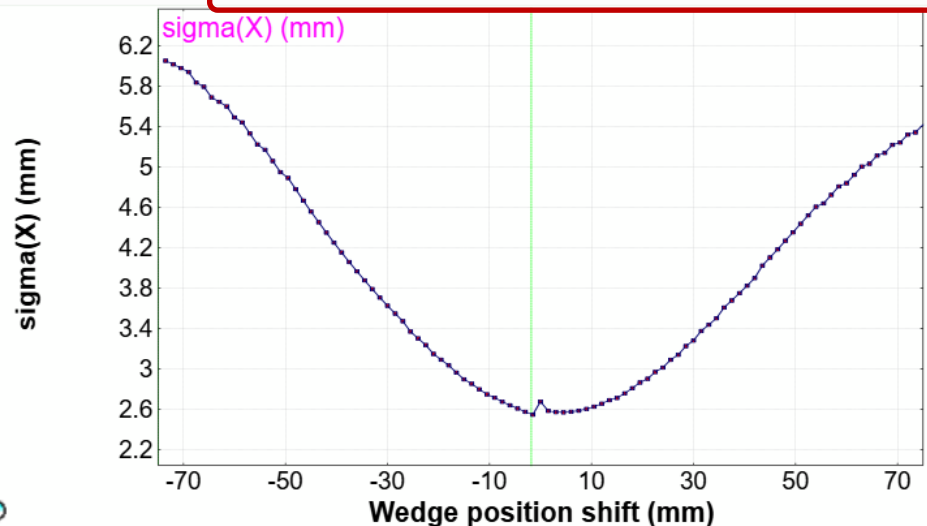


Wedge (PS_wdg) position shift plot for BTS03 [⁴⁴S]

⁴⁸Ca (197.8 MeV/u) + C (8 mm); Settings on ⁴⁴S; Config: °oD°s|°D|wDD|s

dp/p=5.98%; Wedge(s): Al₉₃₉Zn₂₅Mg₂₉ (1.49 mm); Bp (Tm): 5.0144, 5.0144, 4.8181, 4.8181

minimums after BTS03: $\sigma(X) = 2.54$ mm ($\langle X \rangle = -4.4$) at $X_{\text{wedge}} = -1.8$ mm, $\sigma(E) = 1.28$ MeV/u ($\langle X \rangle = -193.8$) at $X_{\text{wedge}} = -75.0$ mm



It shows, that minimum size corresponds to zero shift.

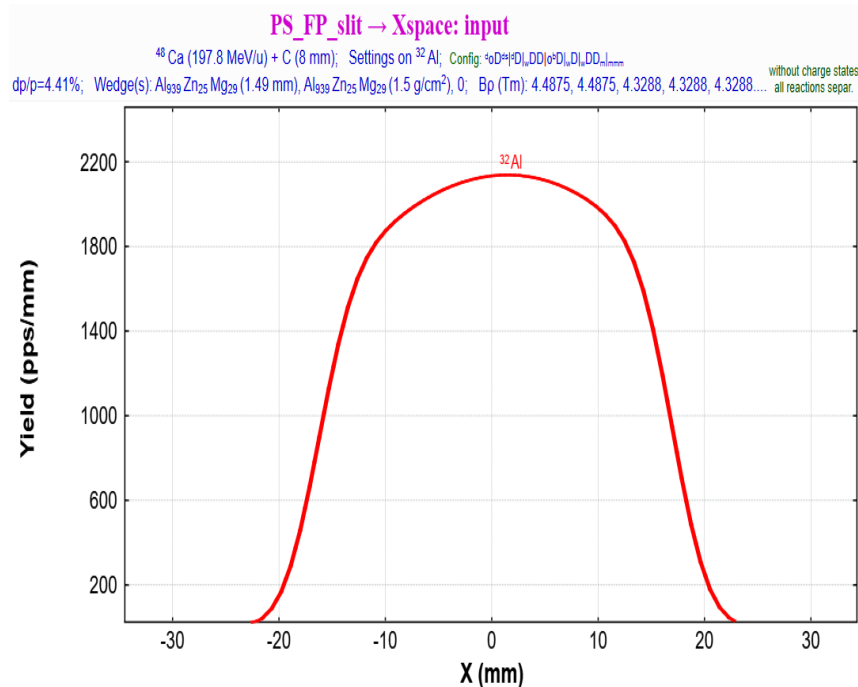
It is possible to see how spatial and energy spread are sensitive from wedge position in the case of ARIS.

Energy and spatial widths are correlated!!

Task:

- there is only one high order wedge calculated for ^{44}S ($B\rho=5.0144$ Tm)
- It is necessary to obtain a ^{32}Al beam
- How to provide high purity of this beam, or by other words to have it achromatic is PS_FP ?
- Is it possible to realize it with a wedge position shift?

LISE ^{32}Al settings ($B\rho_1 = 4.4873$)

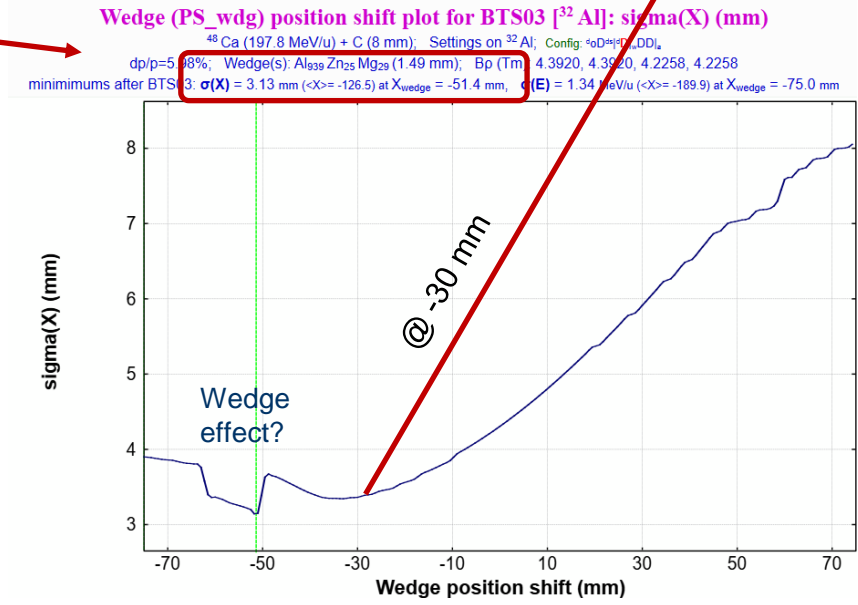
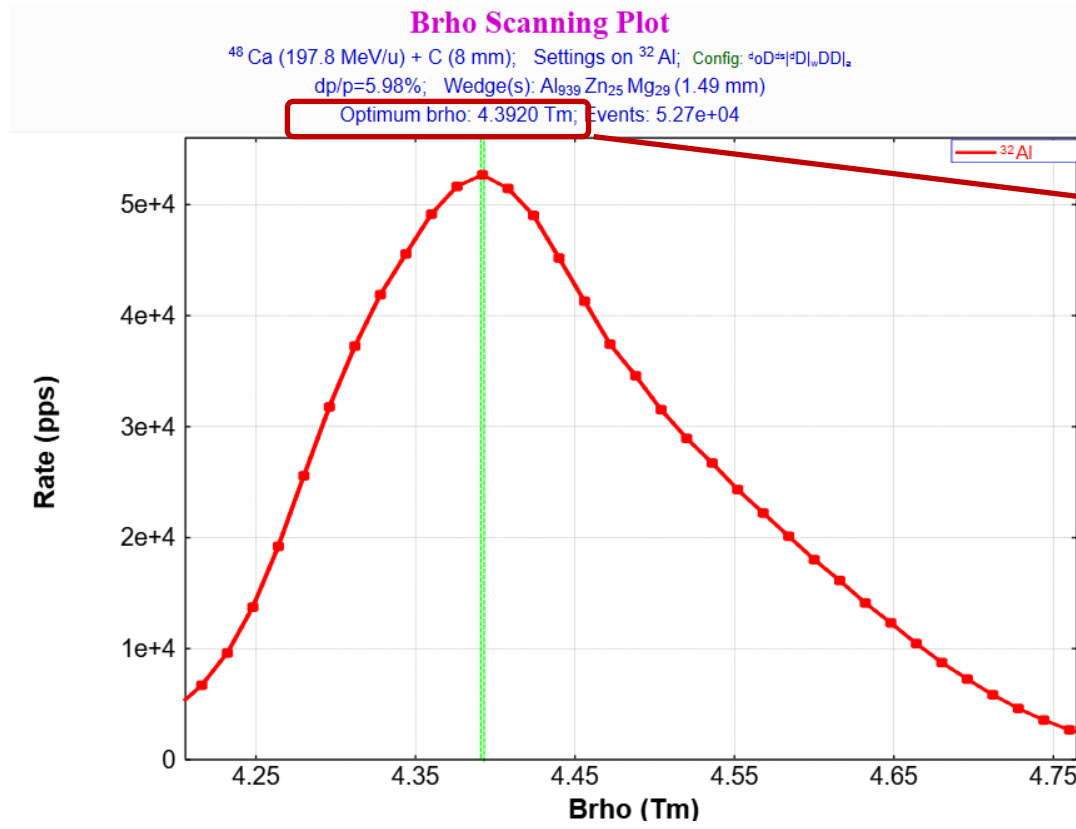
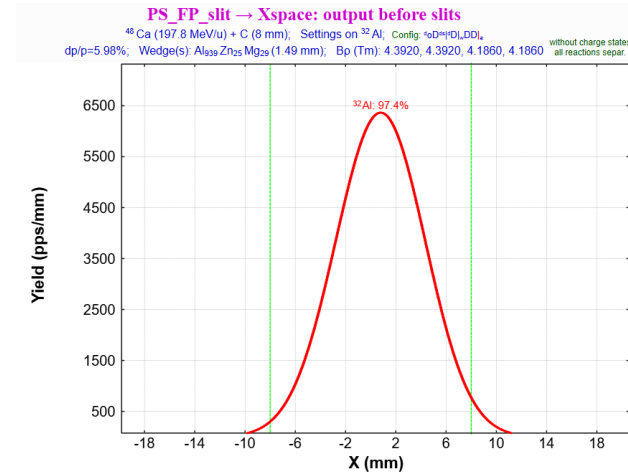


$B\rho_1$	Tm	$\sigma(X)$ mm @ PS_FP no shift	$\sigma(X)$ mm @ PS_FP with shift	Wedge position shift
-2%	4.3975	7.7	-40	3.5
optimal	4.4873	9.5	-50	6.5
+2%	4.577	14	-50	11.2

It's not a optimal way using this utility with iterations
Check the next slide for solution for this task

Task:

- there is only one high order wedge calculated for ^{44}S ($B_p=5.0144$ Tm)
- It is necessary to obtain a ^{32}mAl beam
- How to provide high purity of this beam, or by other words to have it achromatic is PS_FP ?
- Lets use the narrow slits at PS_FP with following faraday cup
- The **Brho scanning utility** tells Brho value which corresponds to smaller X-distribution size



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|--------|----------|--|---------|----------|---|
| 17.0.1 | 01/12/24 | Typos correction from Kenny | 17.1.1 | 02/22/24 | Fissile --> Fissioning in text and menu |
| 17.0.2 | 01/26/24 | LISE tutorial version 2 | 17.1.2 | 02/24/24 | Modification of the wedge dialog to the wedge shift |
| 17.0.3 | 01/31/24 | correction in BI-code (bug fixed with output file) | 17.1.3 | 02/24/24 | BLOCK_Wedge.h: new parameter "wedge_shift" |
| 17.0.4 | 02/05/24 | update of eC_ARIS_k3cb2.lpp for official names | 17.1.4 | 02/24/24 | modification of config read/write for new parameter "wedge_shift" |
| 17.0.5 | 02/09/24 | isomer DB has been updated by DK for Kameda PRC paper | 17.1.5 | 02/24/24 | p_BLOCK_Wedge.cpp: update of GetThicknessWedge and GetThicknessWedgeFromAngle for new parameter "wedge_shift" |
| 17.0.6 | 02/09/24 | bug with mass excess cells in Kinematics Calculator | 17.1.6 | 02/24/24 | Modification of the wedge dialog to the wedge shift : done |
| 17.0.7 | 02/09/24 | extern W_ME was modified everywhere for DefaultMassOption | 17.1.7 | 02/24/24 | Brho Calculation for wedge with shift |
| 17.0.8 | 02/09/24 | new isotope discovery 2023 were updated | 17.1.8 | 02/24/24 | wedge shift -- now inverse |
| 17.1.0 | 02/09/24 | middle version has been changed | 17.1.9 | 02/24/24 | wedge shift -- scan utility preparation |
| | | | 17.1.10 | 02/24/24 | UNREFERENCED_PARAMETER in BLOCK_Compound |
| | | | 17.1.11 | 02/25/24 | correction with calibration-name in config-writing |
| | | | 17.1.12 | 02/25/24 | creation of the d_Scanning_wedgePosition dialog |
| | | | 17.1.13 | 02/25/24 | new distribution function min_i777() |
| | | | 17.1.14 | 02/25/24 | new utility CmWedgePositionScanning() |
| | | | 17.1.15 | 02/25/24 | CmWedgePositionScanning() : sigmaE and positionE added |
| | | | 17.2.0 | 02/25/24 | middle version changed |