

## v.16.5.31

08/06/22

- Beam dump slits are used to change the momentum distributions of the projectile.
- These slits are usually located after first dipole in the unfocused dispersion plane.
- The use of slots at this location can adversely affect transmission calculations depending on the limitations of the transmission model.

Transmission method	Type of calculations	Where is used	Using slits for fragments in a defocused dispersion plane
Ellipse	analytical	Dialog “Goodies” 2d-plots (ellipse mode) RF-kicker tuning	Non-acceptable. Possible incorrect energy interpolation after a cut.
Distribution	analytical	Principal transmission analytical calculation method (setting fragment, background), 2d-plots PseudoMonteCarlo	No recommended. Overestimated accumulated uncertainties. Possible double transmission cut
Monte Carlo	Monte Carlo	Monte Carlo dialog	welcome

ExitBeamDump

Angular Acceptance

Shape:  Rectangle  Ellipse

Horizontal ±: 1000 mrad

Vertical ±: 1000 mrad

Solid angle: 2888.37 msr

Horizontal plane:  Use in Calculations

dispersion [mrad/%]: -5

x' - momentum [%] (accept./disp): 100

Vertical plane:  Use in Calculations

dispersion [mrad/%]: 0

y' - momentum [%] (accept./disp): 100

"ExitBeamDump" block : Apertures (throughout), Slits

Horizontal

Left limit (aperture): -125

Left slit mm: -125

Right slit mm: 21

Right limit (aperture): 125

APERTURES

Shape (see \*)

Rectangle  Ellipse

Use in Calculator

Horizontal  Vertical

Only the Monte Carlo mode uses "Ellipse" shape and aperture settings.

"Distribution" method uses only "Rectangle" shape slits.

SLITS

Slits shape (see\*)

Rectangle  Ellipse

Horizontal Slit

conjointly  Use in Calculations

separately  Show in schematics

Vertical Slit

conjointly  Use in Calculations

separately  Show in schematics

Horizontal plane dispersion (mm%): -10.37

x - momentum (%) (slit / dispersion) total: 14.07

Vertical plane dispersion (mm%): 0

y - momentum (%) (slit / dispersion) total: 100

Vertical

Top limit: 120

Top slit: 120

Bottom slit: -120

Bottom limit: -120

Slits are used for fragment transmission analytical calculations

"Distribution" method  "Ellipse" method

OK Cancel

"Distribution" transmission method

```
bool useSlits = bc->slit.GetWork() &&
(B->slits.useDistributionMethod || Ce->primaryBeamFlag());
```

"Ellipse" transmission method

```
bool useEllipseSlits = c->slits.useEllipseMethod || calc->primaryBeamFlag();
if(c->CheckAllOpticBlock() && useEllipseSlits) PL->PassSlits(c, disx, disy);
```

Unchecking a selected method means:  
These slits won't be used for fragments,  
and they will be used only for a primary beam.

# Example: Slits use for the Distribution method

<b>Projectile</b>	238 U 92+	AF Low 914
	345 MeV/u	1 pA
<b>Fragment</b>	132 Sn	
EERs:	237 U(35)	
<b>T</b> Target	9 Be 4 mm	
<b>Sr</b> Stripper		
<b>D</b> D1	Bp=7.5000 Tm	
<b>S</b> ExitBeamDump	slits	
	-125 H +50	
<b>d</b> Drift 2	beam-line : 3.48 m	
<b>W</b> F1 wedge	Al 2 mm	
<b>S</b> F1 slit	slits	
	-64 H +64	
<b>D</b> D2	Bp=7.1243 Tm	
<b>S</b> F2 slit	slits	
	-20 H +20 -120 V +120	

Slits are used for fragment transmission analytical calculations

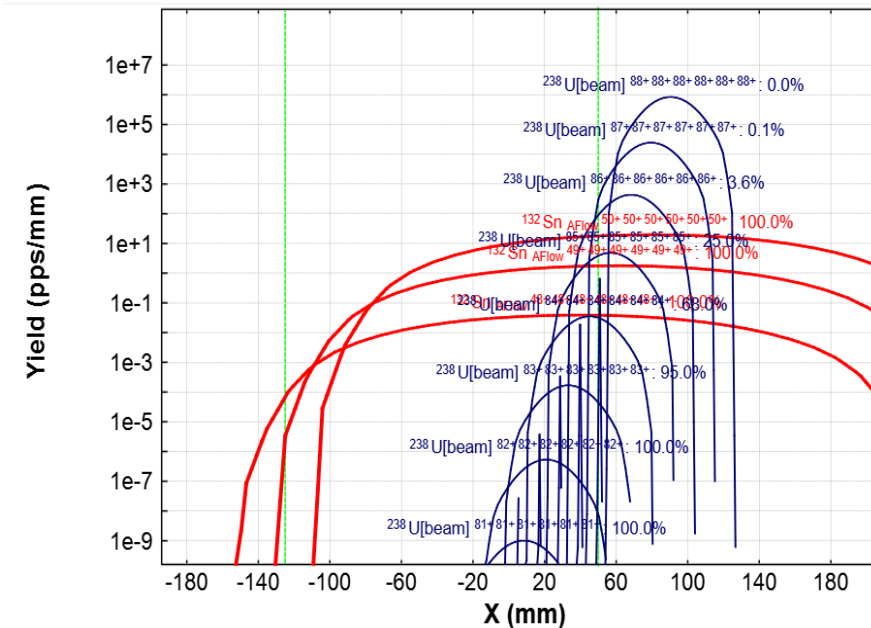
"Distribution" method   
  "Ellipse" method   
 ?

Red color indicates, that these slits are not used for some methods

## ExitBeamDump → Beam & SetFragment Charge States: output: Position

238 U (345 MeV/u) + Be (4 mm); Settings on 132 Sn 50+, 50+; Config: D1  
 dp/p=16.84%; Bp (Tm): 7.5000

without charge states  
 all reactions separ.



132 Sn
2.76e+2
6.966%

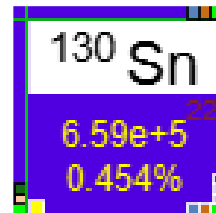
Beam dump slits are **NOT** used for fragments with the Distribution method

132 Sn
8.88e+1
2.244%

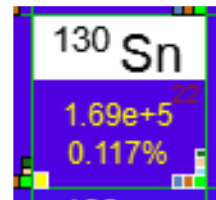
Beam dump slits **are used** for fragments with the Distribution method

Request of Thomas Chillery, Center for Nuclear Study

<b>Projectile</b>	238 U 86+
345 MeV/u	80 pA
<b>Fragment</b>	130 Sn 50+.. 47+
EERs: 238 U(24)	
<b>T</b> Target	<sup>9</sup> Be 3 mm
<b>Str</b> Stripper	
<b>D</b> D1	Bp=7.4800 Tm
<b>S</b> ExitBeamDump	slits
	-125 H +21
<b>d</b> Drift 2	beam-line : 3.48 m
<b>W</b> F1 wedge	Al 6 mm
<b>S</b> F1 slit	slits
	-20 H +20
<b>D</b> D2	Bp=6.2721 Tm
<b>S</b> F2 slit	slits
	-5 H +5



Beam dump slits are **NOT** used for fragments with the Distribution method



Beam dump slits **are used** for fragments with the Distribution method

<b>SUM</b>
1.532e+04
CPU speed
1.35e+03 pps
Eff. 0.441%

Monte Carlo transmission method

# Example: Slits use for the Ellipse method

Request of Thomas Chillery, Center for Nuclear Study

**Projectile**  $^{238}\text{U } 86+$   
345 MeV/u    80 pA

**Fragment**  $^{130}\text{Sn } 50+.. 47+$

EERs:  $^{238}\text{U}_{(24)}$

**Target**  $^9\text{Be } 3 \text{ mm}$

**Stripper**

**D1** Bp=7.4800 Tm

**ExitBeamDump** slits  
-125 H +21

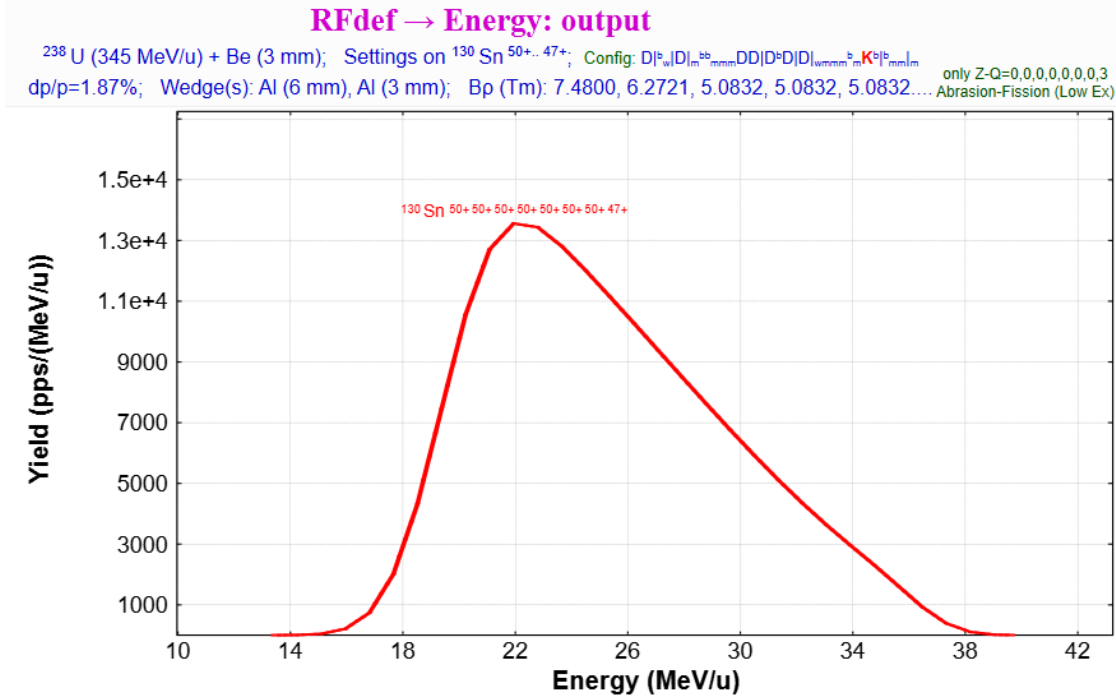
**Drift 2** beam-line : 3.48 m

**F1 wedge** Al 6 mm

**F1 slit** slits  
-20 H +20

**D2** Bp=6.2721 Tm

**F2 slit** slits  
-5 H +5



correct

Calculations for the setting fragment

	Values corresponding to Energy		
Before the RF separator	$\langle E \rangle - dE$	$\langle E \rangle$	$\langle E \rangle + dE$
Energy [MeV/u]	22.49	26.72	30.96
Time of flight [ns]	675.06	668.35	661.64
Phase [deg]	42.59	358.51	314.42

wrong

Calculations for the setting fragment

	Values corresponding to Energy		
Before the RF separator	$\langle E \rangle - dE$	$\langle E \rangle$	$\langle E \rangle + dE$
Energy [MeV/u]	40.78	41.79	42.79
Time of flight [ns]	649.8	648.72	647.64
Phase [deg]	236.62	229.53	222.45

Beam dump slits are **NOT** used for fragments with the **Ellipse** method

Beam dump slits **are used** for fragments with the **Ellipse** method