# S800 reverse simulation with detector resolution



₹ 238U : Monte Carlo Transmission Plot op/p=3.06%; 8mo(1m); 3.3431, 3.3431, 3.3431 Continue <sup>238</sup>U : Monte Carlo Transmission Plot <sup>238</sup>U (44.3 MeV/u) + ; Transmitted Fragment <sup>238</sup>U<sup>69+..69+</sup> (beam); Optics Order: 5 dp/p=3.08%; Brho(Tm): 3.3431, 3.3431, 3.3431 AngAccept: Off; Bounds: ON; "Stripper" - last block for MC calc; Gate 1: "NOT" (X [mm]); Config: DSSSSSDSSSDSSSDSSSMSMSMSMSM Contou X' vs Y' um 6e+04 <X> 1.81793 <Y> 3 62921 dX 58.6513 dY 57.1599 XY 1.501e-01 100 5.997e+04 60 0.00e+00 pps Rate (pps) 1.573e+05 20 Beam: 1.2e -20 -60 after -100 -140 <mark>2</mark> 1 -180 -180 -140 -100 -60 -20 20 60 100 140 180 05-11-2015 15:08:57 us-11-2015 15:08:57 LISE++ [G:le12006\Br1\COSY\QuadNew X11.70- GOOD\FR1\Bp1\_COSY\_beamffer1.lp5[tripper": X'(Theta) [mrad]

op/p=3.06%; 8mo(1m); 3.3431, 3.3431, 3.3431 📮 238U : Monte Carlo Transmission Plot Continue <sup>238</sup>U : Monte Carlo Transmission Plot <sup>238</sup>U (44.3 MeV/u) + ; Transmitted Fragment <sup>238</sup>U<sup>69+..69+</sup> (beam); Optics Order: 5 dp/p=3.08%; Brho(Tm): 3.3431, 3.3431, 3.3431 AngAccept: Off: Bounds: ON: "Stripper" - last block for MC calc; Gate 1: "NOT" (X [mm]); Config: DSSSSSSDSSSDSSSDSSSMSMSMSM Contou X vs dP/P um 3.51e+04 X> 0.33254 Y> -0.0039398 dX 1.15164 dY 1.15498 XY 5.836e-03 "Stripper": dP/P [%] 3.512e+04 1.5 0.00e+00 pps Rate (pps) 0.5 Beam: 6.9e+ -0.5 after -1.5 15 -2.5 <mark>2</mark> 1 -3.5 -3.5 -2.5 -1.5 -0.5 0.5 1.5 2.5 05-11-2015 14:55:58 LISE++ [G:\e12006\Br1\COSY\QuadNew X11.70- GOOD\FR1\Bp1\_COSY\_beam\_FR

Initial @ Target

V3\_o5.ray

No angular acceptances No FP slits All Bounds are taken into account for the next steps



#### Direct @ FR +16.73 cm

Ideal resolution







Case 2-1

Reverse @ Target <u>1<sup>st</sup> order (</u>5->1) Ideal resolution









## **Reverse @ Target** 1<sup>st</sup> order (5->1) Ideal resolution

V3\_o5.ray



200

100

05-11-2015 17:44:41

-70

-50

-30

LISE ++ [G:le12006/Br1/COSYIQuadNew X11.70-GOOD/FR1/Bafter."Drifts1ar, X/(Theta) [mrad]: window projection

-10

10

30

50







Case 2-2

Reverse @ Target 2<sup>nd</sup> order (5->2) Ideal resolution





Case 2-2

**Reverse @ Target** 

2<sup>nd</sup> order (5->2) Ideal resolution





### Case 2-5

Reverse @ Target <u>5<sup>th</sup> order (</u>5->5) Ideal resolution





Case 3

#### **Reverse @ Target** 5<sup>th</sup> order (5->5)

Resolution  $\frac{dX = 0.25 \text{ mm}}{dX' = 0.25 \text{ mrad}}$   $\frac{dY = 0.50 \text{ mm}}{dY' = 0.50 \text{ mrad}}$  dE = 0%

V3\_o5\_S.ray





Case 3

<b>Reverse</b> @ Targe
5 <sup>th</sup> order (5->5)

Resolution  $\frac{dX = 0.25 \text{ mm}}{dX' = 0.25 \text{ mrad}}$   $\frac{dY = 0.50 \text{ mm}}{dY' = 0.50 \text{ mrad}}$  dE = 0%

V3\_o5\_S.ray









<b>Reverse</b> @ Target	
$\Gamma^{\text{th}}$ and an $(\Gamma \setminus \Gamma)$	

5<sup>th</sup> order (5->5)

Resolution  $\frac{dX = 0.25 \text{ mm}}{dX' = 0.25 \text{ mrad}}$   $\frac{dY' = 0.50 \text{ mm}}{dY' = 0.50 \text{ mrad}}$   $\frac{dY' = 0.50 \text{ mrad}}{dE = 0\%}$ 

V3\_o5\_S.ray





F Ions rays after target : Monte Carlo Yield Plot



5<sup>th</sup> order (5->5)

Resolution dX = 0.25 mm dX' = 0.25 mraddY = 0.50 mmdY' = 0.50 mraddE = 0.2%

It corresponds ~ 0.2 ns TOF resolution

": dP/P [%]: window projection --- Input rays file: "v3\_o5\_SE"; Number of rays: 30000; Optics Order: dp/p=7.71% ; Brho(Tm): 3.3431, 3.3431, 3.3431 dP/P ON; Bounds: Off; "Drift 1a" - last block for MC calc; no gates; Config: DSSDSSSDSSSSSSSM 200 160 120 80 40 -3 -2 2 3 05-11-2015 16:59:15 -3.0481e-1 u5-11-2015 10:59:15 LISE ++ [G:\e12006\Br1\COSY\QuadNew X11.70- GOOD\FR1\Br1 investee CDrift 18': dP/P [%]: window projection

Ions rays after target : Monte Carlo Yield Plot

- C - X





# Summary

				Quality of reconstruction				
Reverse Case	Optics	Spatial resolution	dE	x	Y	X'	۲	Global
2-1	5->1	ideal	0	2	7	3	7	3
2-2	5->2	ideal	0	5	8	8	9	7
2-3	5->5	ideal	0	10	10	10	10	10
3	5->5	good	0	8	8	10	9	9
4	5->5	good	0.2%	1	8	4	9	4
5	5->5	poor	0	4	4	8	7	6

Case 3 : current analysis for #12006 experiment (S800) Case 2-1 (inverse 1<sup>st</sup> order LISE<sup>++</sup>) & 4 (E from ToF) : non-acceptable

We need <sup>(MH)</sup> for this S800 particular case\*

- (1) at least 2nd order,
- (2) good spatial resolution,
- (3) an energy measurement that is clearly better than a typical TOF measurement.

\* for A1900 (achromatic case) the conclusions may be different