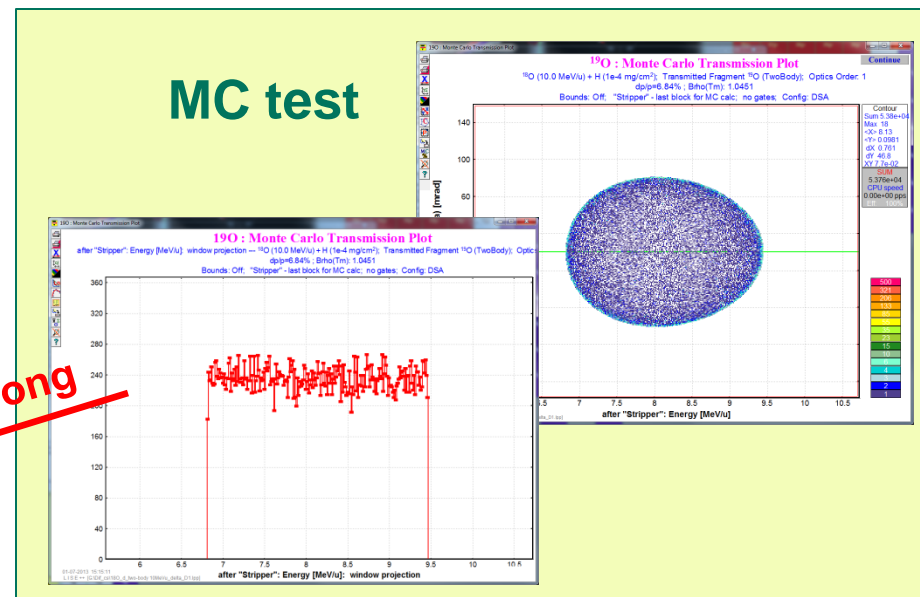
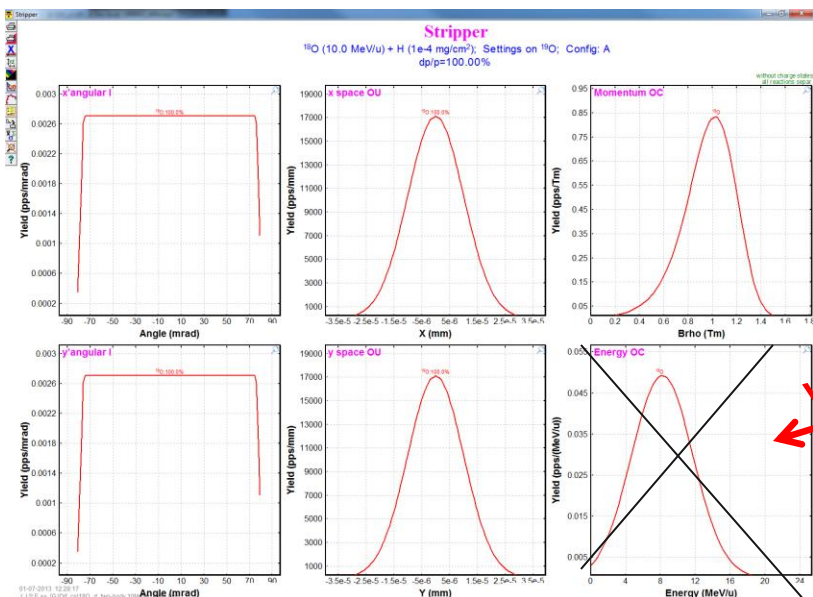
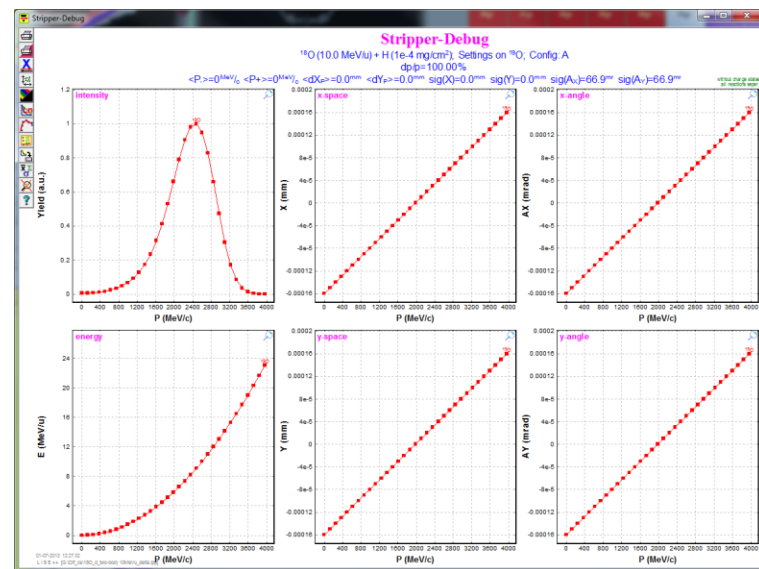
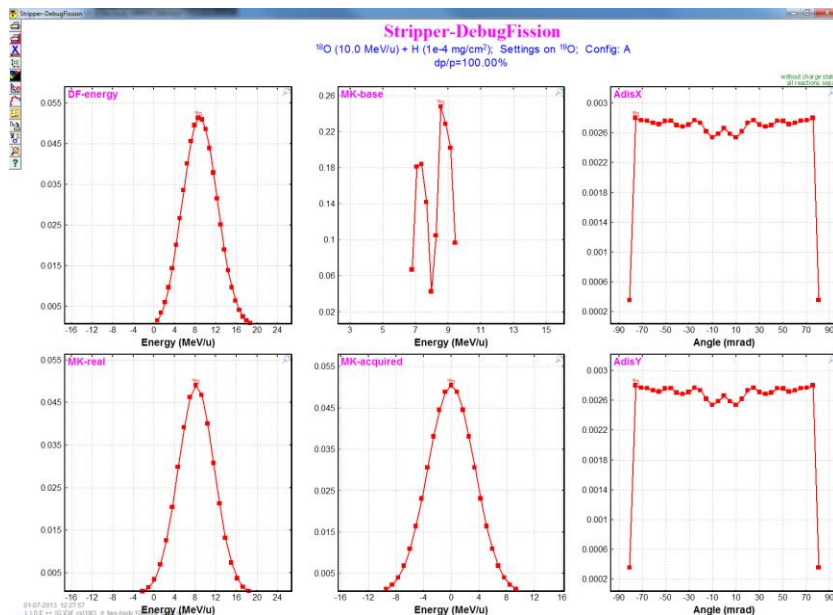


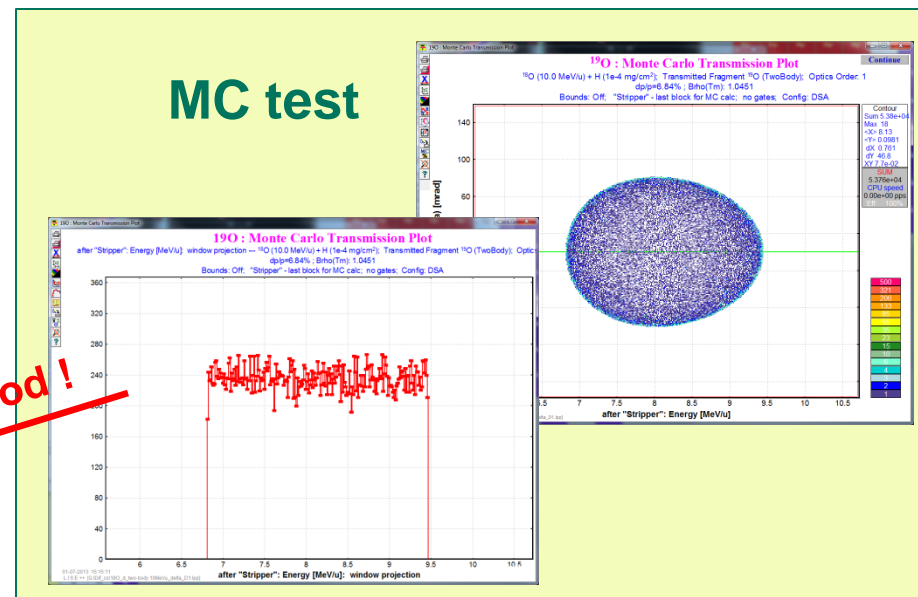
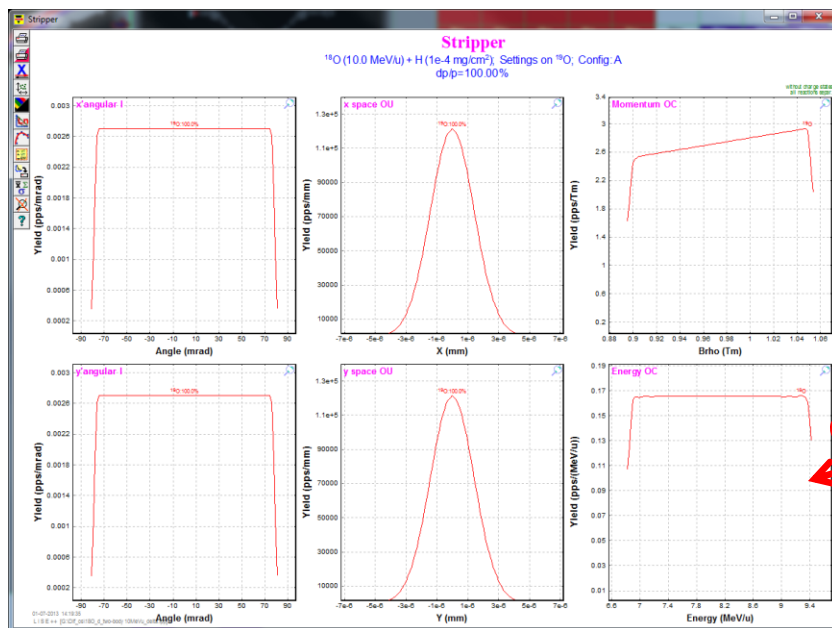
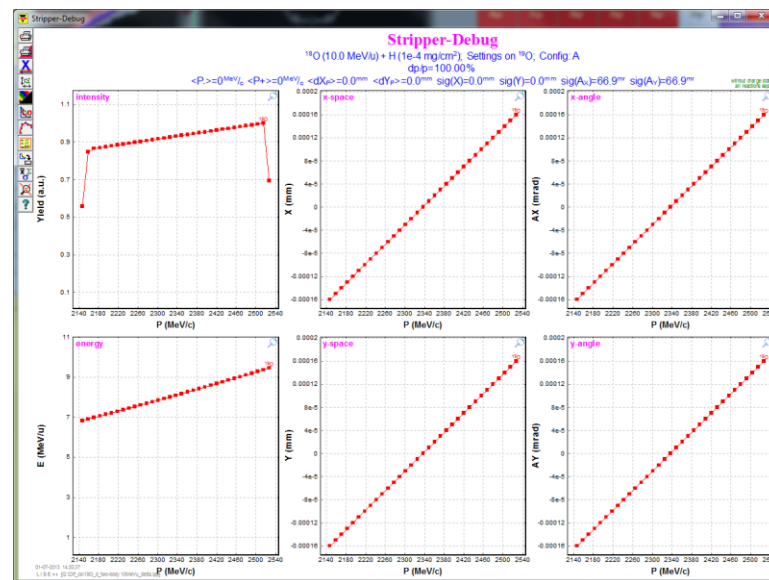
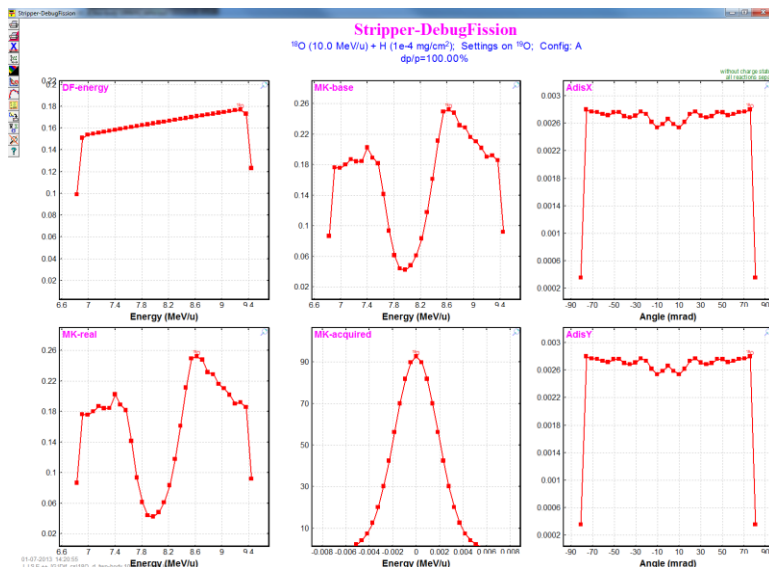
**Update 2**  
**V.9.6.65**  
**From 07/03/13**

- 1. Modification analytical transmission calculations for two-body and fission reactions**
- 2. Use UserDiffCS in Analytical transmission calculations for two-body reactions**
- 3. Excitation Energy of fragments**
- 4. Correction in the MC Output rays dialog**

## Old analytical solution



## New analytical solution

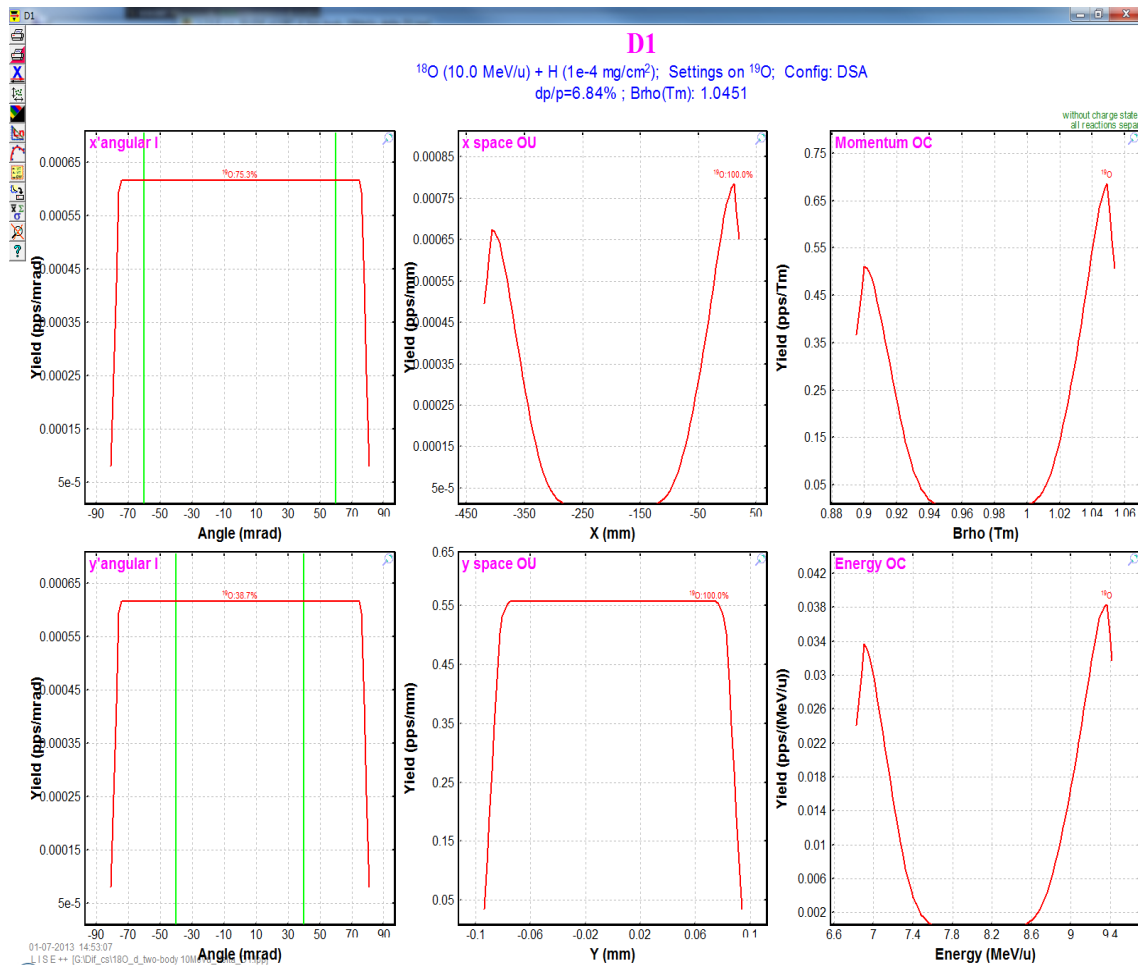


[http://lise.nsl.msu.edu/9\\_6/DifCS/180\\_d\\_two-body\\_10MeVu\\_delta\\_D1.lpp](http://lise.nsl.msu.edu/9_6/DifCS/180_d_two-body_10MeVu_delta_D1.lpp)

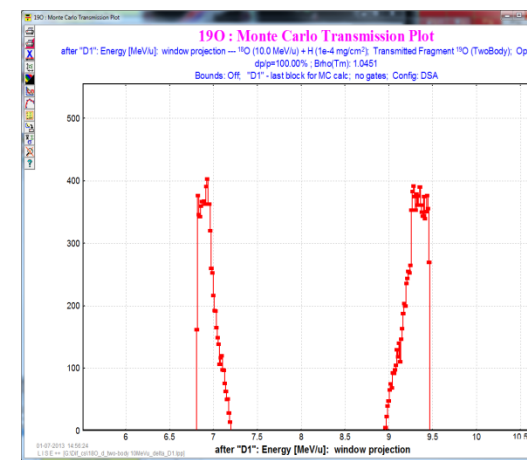
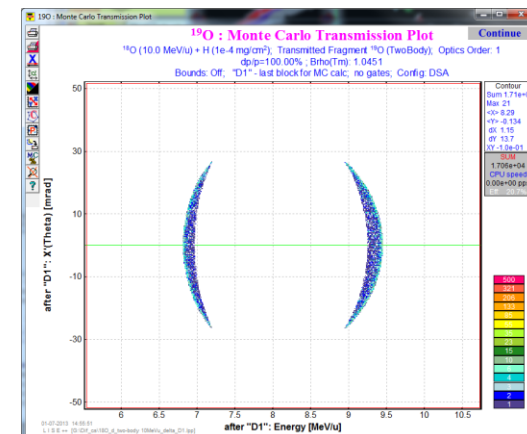
Thin target  
Zero emittance

## After Angular acceptance use

Analytical solution: 29% transmission



MC solution: 21% transmission

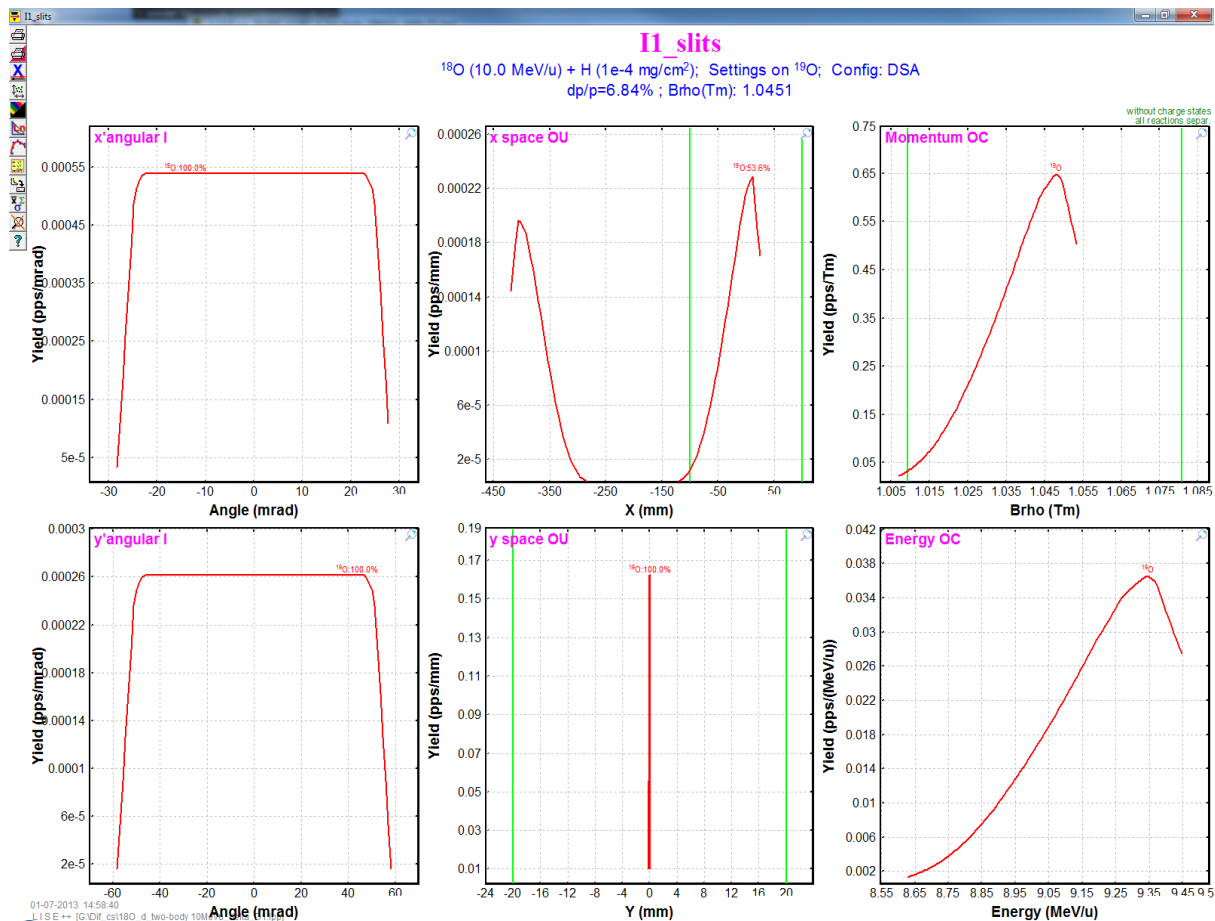


[http://lise.nsl.msu.edu/9\\_6/DifCS/180\\_d\\_two-body\\_10MeVu\\_delta\\_D1.lpp](http://lise.nsl.msu.edu/9_6/DifCS/180_d_two-body_10MeVu_delta_D1.lpp)

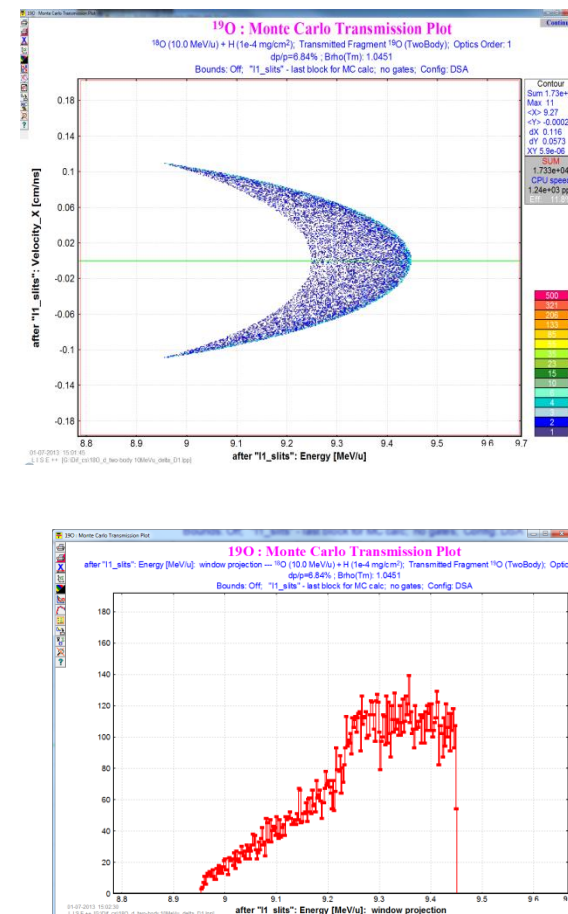
## After Angular acceptance + slits use

Thin target  
Zero emittance

Analytical solution: 17.2% transmission



MC solution: 12% transmission



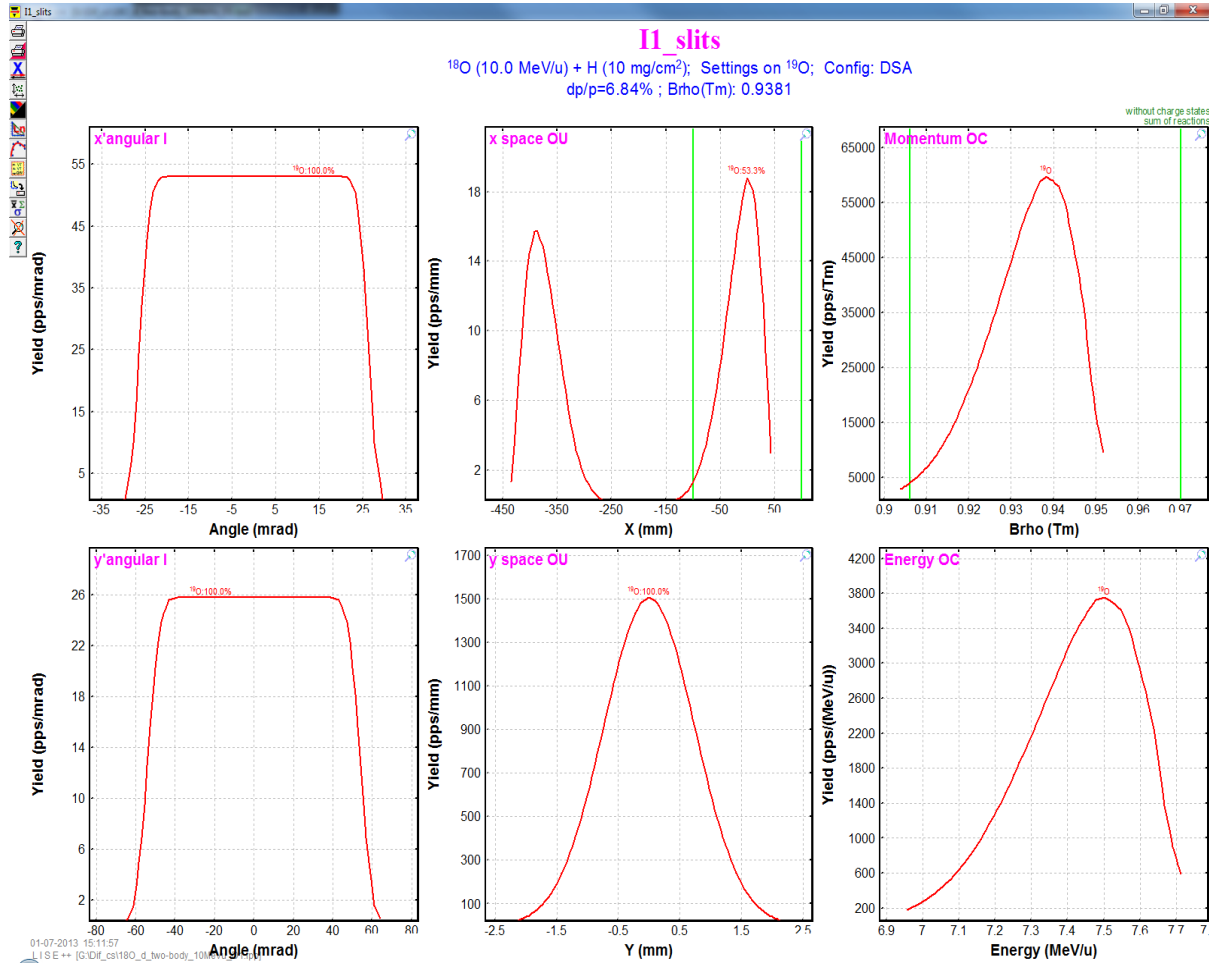


[http://lise.nsl.msu.edu/9\\_6/DifCS/180\\_d\\_two-body\\_10MeVu\\_D1.lpp](http://lise.nsl.msu.edu/9_6/DifCS/180_d_two-body_10MeVu_D1.lpp)

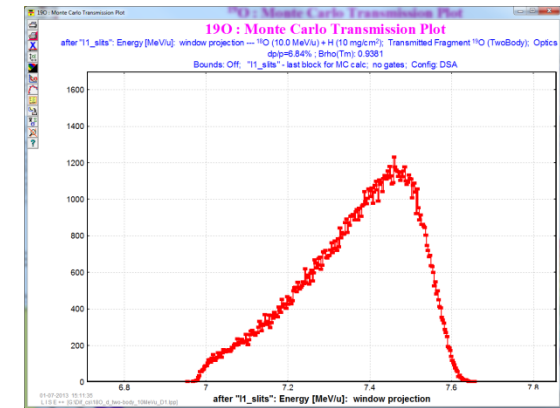
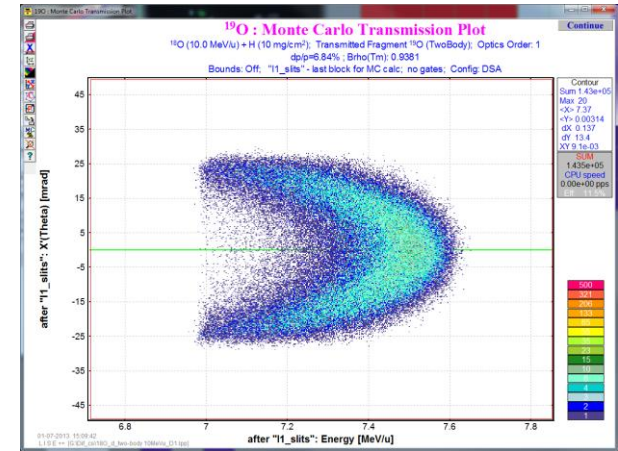
Target 10mg/cm<sup>2</sup>  
Real emittance

## After Angular acceptance + slits use

Analytical solution: 15.1% transmission



MC solution: 11.5% transmission



Isotropic,  $E^* = 0$

Differential cross section file

180 (10.0 MeV/u) + 2H -> 190 (+1H)

Data File: Load from file, View data, Clear data

190\_isotropic.txt

Number of rows: Data (23), Comments (0), Total (23)

Excitation energies of products (MeV):  $E^*$  of 190 = 0,  $E^*$  of 1H = 0

Integrated Cross Section (mb): 25.13

Dif. Cross Section Plots

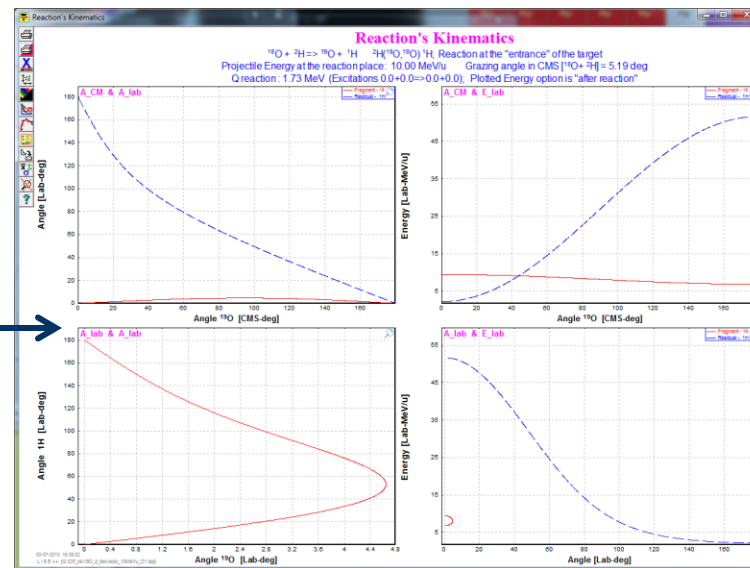
OK, Cancel, Help

Note: The Differential Cross Section file is in ASCII format. Comment string begin with "!" or "!"

Two columns, where the 1st is Angle [in degrees], the 2nd is Diff. CS in System of Center mass [mb/str]

The columns can be separated by a Space, a Comma or a Tabulation. User can put comments also at the end of data line

Utilities: Kinematics Plots, 2D Kinematics (MC)



Monte Carlo calculation of fragment transmission

What isotope transmission to calculate? One fragment of interest. Chose manually here

Group of isotopes already calculated by the Distribution method (Ncalc = 0)

List of isotopes from file to produce inside target

Input ions rays from file emitted from target

Chose fragment of interest: A: 19, Z: 8

Charge states:  $8+ D1$

Reaction mechanism: Two body reaction

MC transmission options: Show Prefragments, "Distribution" calculation, MC calculation to file, Monte Carlo calculation 2D-plot

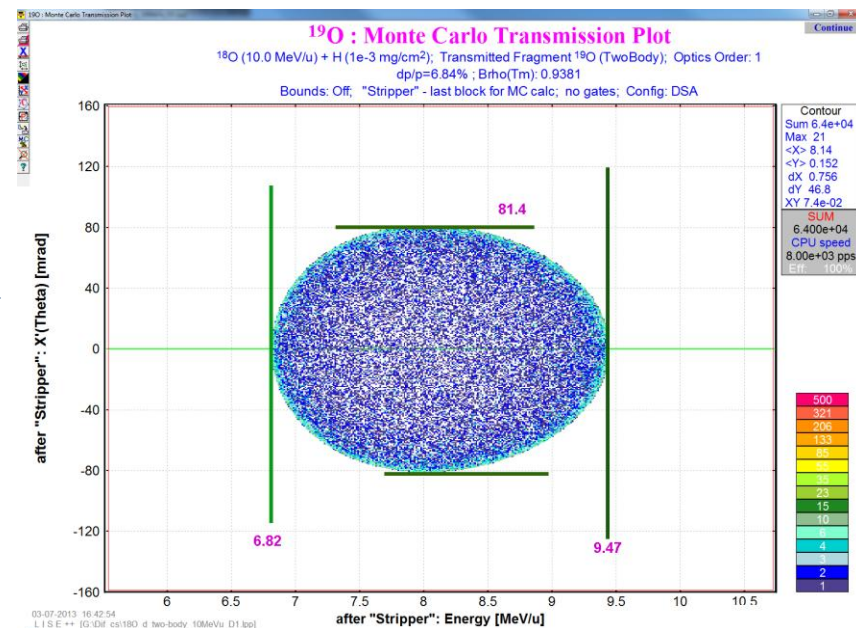
X-coordinate: Stripper (mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad)

Y-coordinate: Stripper (mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad, mm, mrad)

Fission (Two body) fragment information: Projectile (180, 0.0), Fragment (C) (190, 0.0), Residual (D) (1H, 0.0)

Final Fragment "C": 190

Ex energy: Max. Lab. Angle = 80.9 mrad, Fragment energy Max. = 9.4 MeV/u, Fragment energy Min. = 6.8 MeV/u, Projectile energy = 10.0 MeV/u, Cross section = 2.5e+01 mb



Isotropic,  $E^* = 6$

**Differential cross section file**

18O (10.0 MeV/u) + 2H -> 19O (+1H)

Data File: 19O\_isotropic.txt

Number of rows: Data, Comments, Total

Excitation energies of products (MeV):  
 $E^*$  of 19O = 6     $E^*$  of 1H = 0

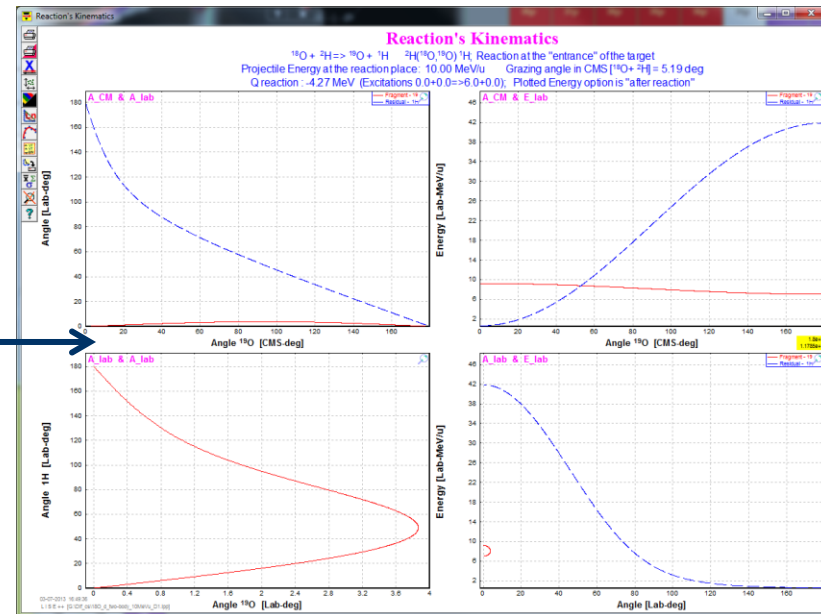
Integrated Cross Section (mb): 25.13

Utilities: Kinematics Plots, 2D Kinematics (MC)

Note: The Differential Cross Section file is in ASCII format. Comment string begin with "!" or "!"

Two columns, where the 1st is Angle in [degrees], the 2nd is Diff.CS in System of Center mass [mb/sr]

The columns can be separated by a Space, a Comma or a Tabulation. User can put comments also at the end of data line



**Monte Carlo calculation of fragment transmission**

What isotope transmission to calculate?  
 • One fragment of interest. Choose manually here

Group of isotopes already calculated by the Distribution method (Ncalc=0)

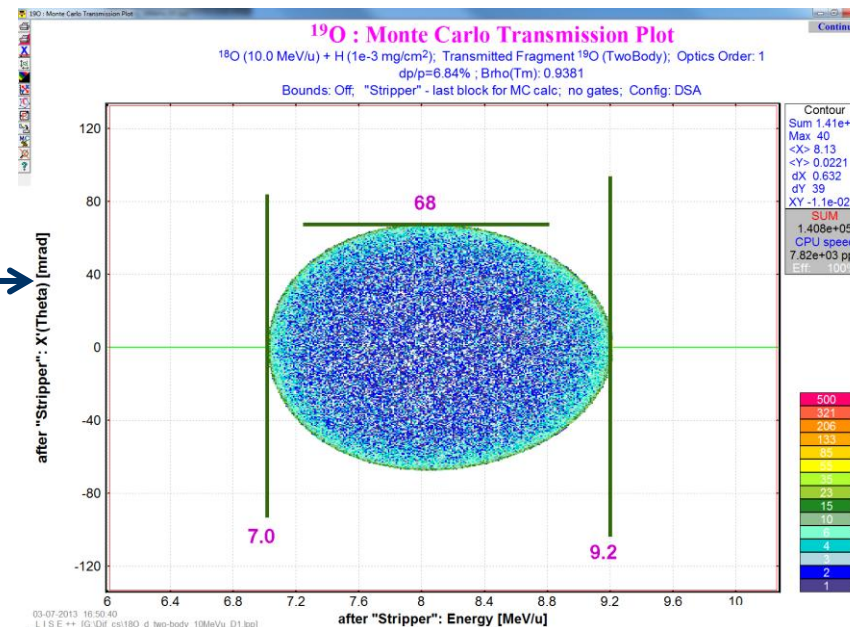
Choose fragment of interest: A=19, Z=8

Reaction mechanism: Two body reaction

MC transmission options: Show Prefragments

Final Fragment "C":  
 Projectile: 18O, Ex energy: 0.0 MeV/u  
 Fragment [C]: 19O, E: 6.0 MeV/c  
 Residual [D]: 1H, E: 0.0 MeV/c

Max Lab. Angle = 67.4 mrad  
 Fragment energy Max. = 9.2 MeV/u  
 Fragment energy Min. = 7.0 MeV/u  
 Projectile energy = 10.0 MeV/u  
 Cross section = 2.5e+01 mb





MC\_LISE.ray

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	! Last block "Stripper", setting fragment: 19O8+..8+ (Two body reaction); N_Locations=1; N_fields=7; N_Rays=100												
2	! location #01 : Stripper												
3	i N	01-Z (atomic number)	01-A (mass number)	01-N (neutron number)	01-q (ion charge)	01-Z-q	01-A-2q	01-A-3q					
4	1	8	19	11	8	0	3	-5					
5	2	8	19	11	8	0	3	-5					
6	3	8	19	11	8	0	3	-5					
7	4	8	19	11	8	0	3	-5					
8	5	8	19	11	8	0	3	-5					
9	6	8	19	11	8	0	3	-5					
10	7	8	19	11	8	0	3	-5					
11	8	8	19	11	8	0	3	-5					
12	9	8	19	11	8	0	3	-5					
13	10	8	19	11	8	0	3	-5					
14	11	8	19	11	8	0	3	-5					
15	12	8	19	11	8	0	3	-5					
16	13	8	19	11	8	0	3	-5					
17	14	8	19	11	8	0	3	-5					