

v.9.6.46
from 06/24/13

Requests by
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Update
V.9.6.54
From 06/30/13

UserDiffCS \equiv User Differential Cross Sections

1. Some definitions and links on files used in this document
2. How to load the “UserDiffCS” utility
3. UserDiffCS dialog
4. UserDiffCS plots (cross sections and kinematics)
5. UserDiffCS in the MC 2d-kinematics
6. New parameters the MC transmission dialog
7. Modifications in the MC transmission dialog for two-body reactions
8. UserDiffCS in LISE++ files (save and restore) *(version 9.6.54)*
9. Use UserDiffCS in MC transmission for two-body reactions *(version 9.6.54)*
10. Next steps in UserDiffCS development

Kinematics Calculator



MC Transmission



MC Kinematics

LISE++ files:

$d + {}^{18}\text{O} \rightarrow p + {}^{19}\text{O}$
 ${}^3\text{He} + d \rightarrow p + \alpha$

http://lise.nslc.msu.edu/9_6/DifCS/d_18O.lpp
http://lise.nslc.msu.edu/9_6/DifCS/d_3He.lpp

DiffCS Files:

Ground State :
 At 0.96 MeV :
 Isotropical distribution:

http://lise.nslc.msu.edu/9_6/DifCS/190_gs.txt
http://lise.nslc.msu.edu/9_6/DifCS/190_L0.96.txt
http://lise.nslc.msu.edu/9_6/DifCS/190_isotropic.txt

1. "Utilities" menu

Utilities 1D-Plot 2D-Plot Databases Help

- LISE++ for Excel
- CODES : Charge, Global, PACE4, etc.
- Radioactivity, decays
- Reactions utilities**
- Plots : Energy loss, Ranges, Stragglng, etc.
- NSCL / FRIB rates
- Set-up utilities
- Range optimizer (Gas cell utility)
- Gas pressure optimization for gas-filled dipole
- CATCHER utility (ISOL, Fusion-Residual)
- Rate & transmission calculation: batch mode
- Stripper foil lifetime

Reaction's Characteristics

Differential Cross Sections ; LAB <-> CM converter

Electromagnetic excitation plots

Create an initial file for nucleon pick up (beta)

User cross-sections analysis using Abrasion-Ablation model

Two-body reactions : Differential Cross Section, Converter LAB <-> CM

Participants	ME [MeV]	Excitation Energy	
A Beam 2H	13.14	0	Beam energy = 6.0 MeV/u
B Target 180	-0.78	0	
C* Fragment 1H	7.29	0	
D* Residual 190	3.33	0	Q-value = 1.73 MeV

Ok Quit

2. Kinematics calculator

Kinematics calculator (relativistic)

Reactions

TWO BODY reaction B (A, C) D

SCATTERING B (A, C+A) D=B

BREAKUP (FISSION) (gamma-emission) x (A, C, D) x

Participants

	ME [MeV]	Excitation Energy	E[CM] = 10.79 MeV
A Beam 2H	13.14	0	Beam energy = 6.0 MeV/u
B Target 180	-0.78	0	Intensity = 1 pA
C* Fragment 1H	7.29	0	Target thickness = 1e-1 micron
D* Residual 190	3.33	0	Q-value = 1.73 MeV

Reaction takes place at the

ENTRANCE of the target MIDDLE of the target EXIT of the target

Set-up

Search an angle in CM

from 0 degrees and up

from 180 degrees and down

fragment (C) residual (D)

R = 100 cm 100 cm

w = 1 cm 1 cm

h = 2 cm 2 cm

Angle (deg) = 46.97 47.453 50 130

fragment (C) residual (D) fragment (C) residual (D)

Calculations

	LAB	CM	
Counting in monitor =	6.56e-2	5.12e-1	pps
Differential Cross Section =	110	833	100 100 mb/sr
Energy after reaction =	12.94	0.0361	11.793 0.03 MeV/u*
Energy at the entrance of detectors =	12.94	0.0343	MeV/u (** for gamma [MeV])
Maximum Angle =	180.00	47.99	deg
Solid Angle =	0.2	0.2	0.22 1.72 msr
delta T theta =	0.57	0.57	0.6 4.8 deg

Kinematics plots

Diff CS converter

2D fragment plot (Monte Carlo)

3body kinematics

Differential cross section file

2H (6.0 MeV/u) + 180 -> 1H (+190)

Data File

Load from file View data Clear data

Number of rows

Data	Comments	Total

Excitation energies of products (MeV)

E* of 1H = 0 E* of 190 = 0

Integrated Cross Section (mb)

Diff Cross Section Plots

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

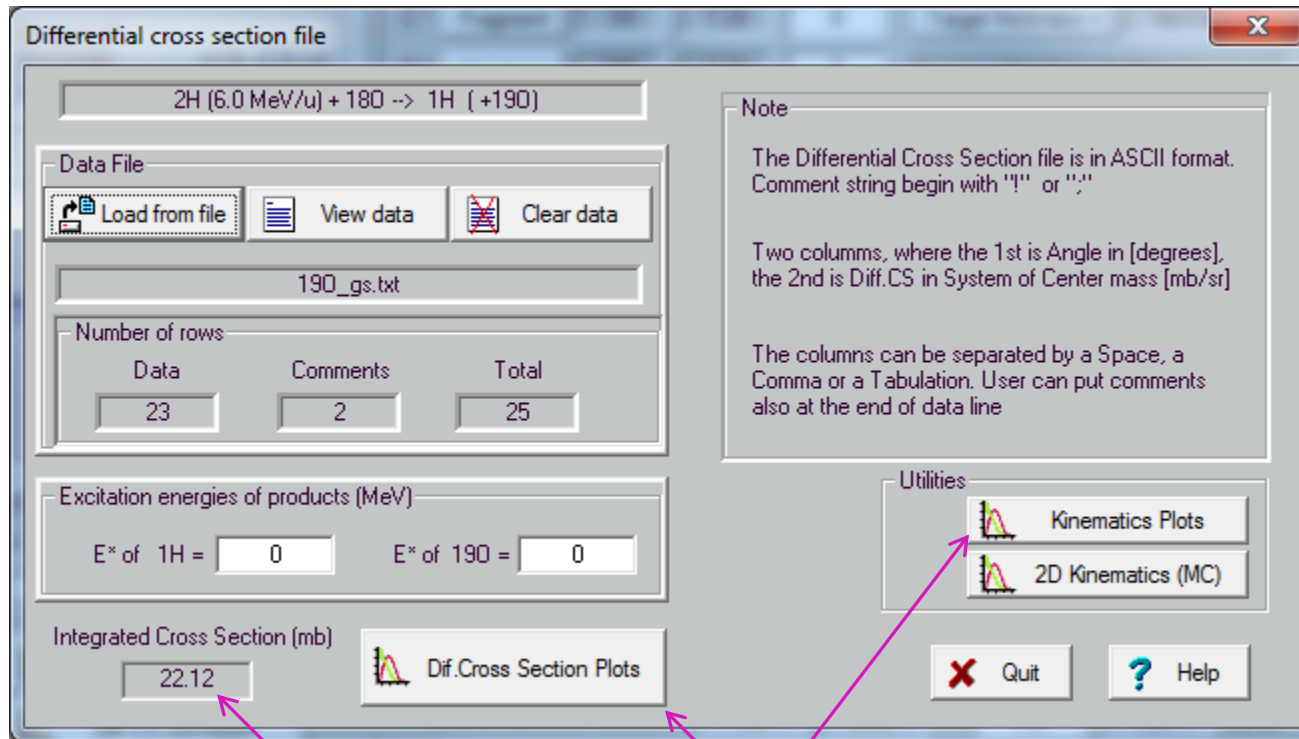
Utilities

Kinematics Plots

2D Kinematics (MC)

Quit Help

User Diff Cs file is $d\sigma / d\Omega$ (mb/sr) in CMS

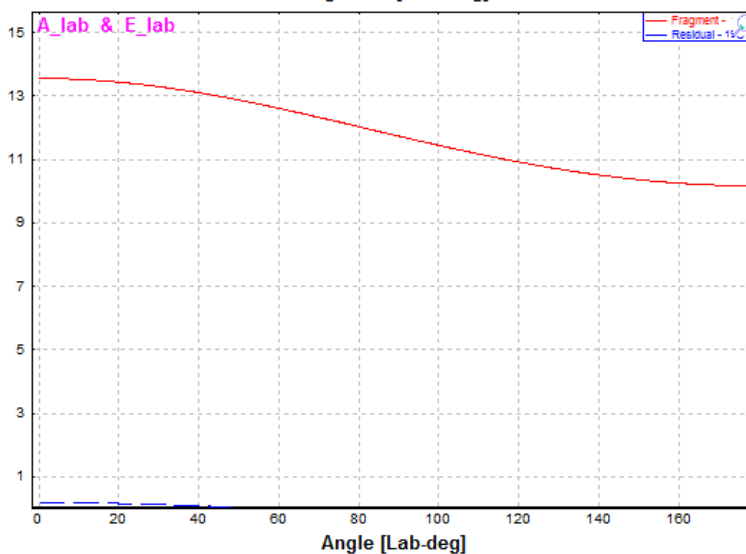
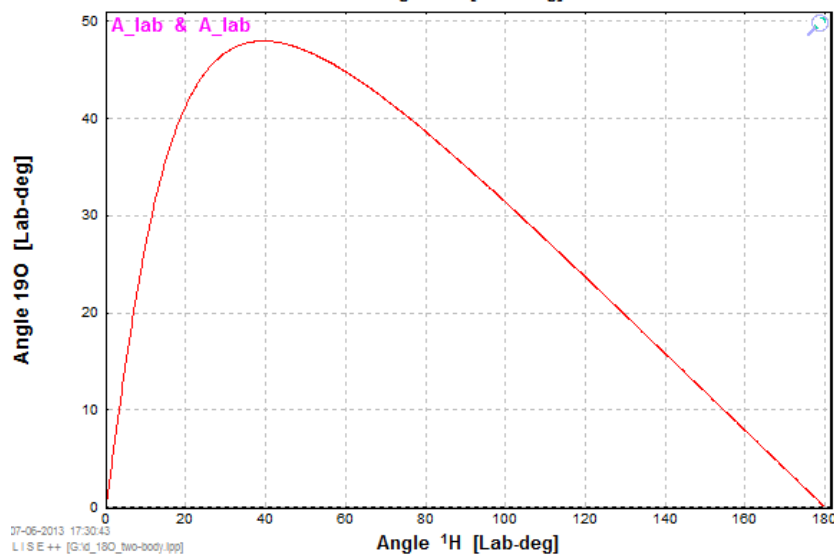
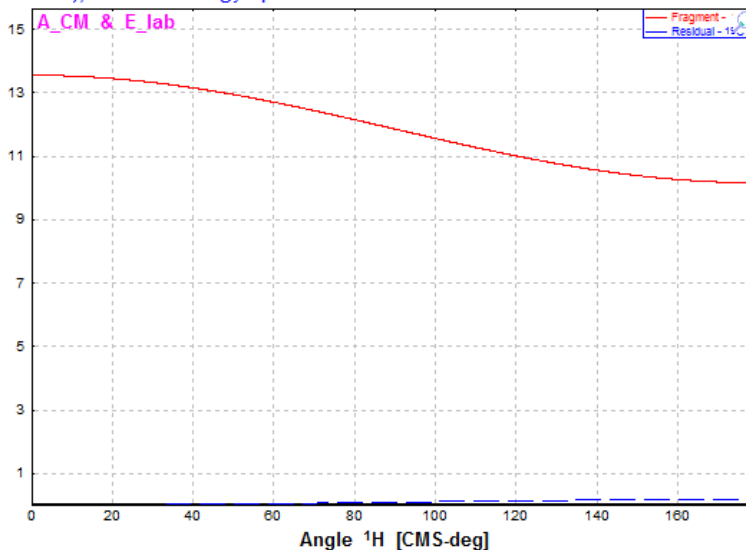
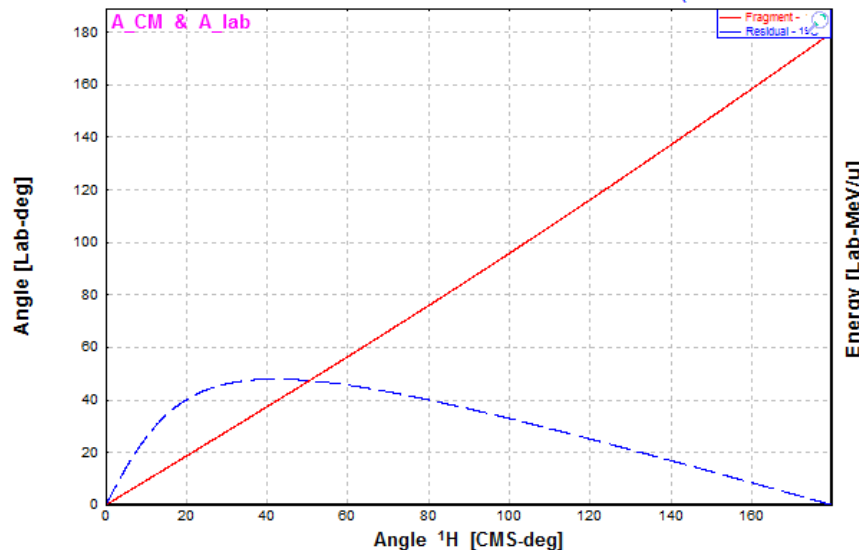


LISE++ automatically integrates the UserDiffCS ($d\sigma / d\theta$)

These buttons become enable after the UserDiffCS file loaded

Reaction's Kinematics

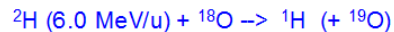
${}^2\text{H} + {}^{18}\text{O} \Rightarrow {}^1\text{H} + {}^{19}\text{O}$ ${}^{18}\text{O}({}^2\text{H}, {}^1\text{H}){}^{19}\text{O}$; Reaction at the "entrance" of the target
 Projectile Energy at the reaction place: 5.96 MeV/u Grazing angle in CMS [${}^2\text{H}+{}^{18}\text{O}$] = 9.00 deg
 Q reaction: 1.73 MeV (Excitations 0.0+0.0=>0.0+0.0); Plotted Energy option is "after reaction"



07-06-2013 17:30:43
 LISE++ [G:\ic_18O_two-body.tpp]

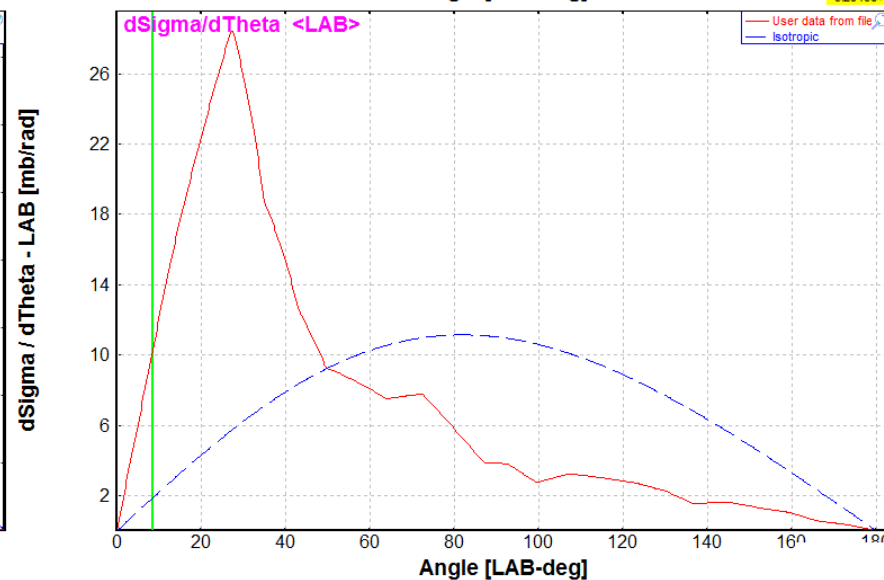
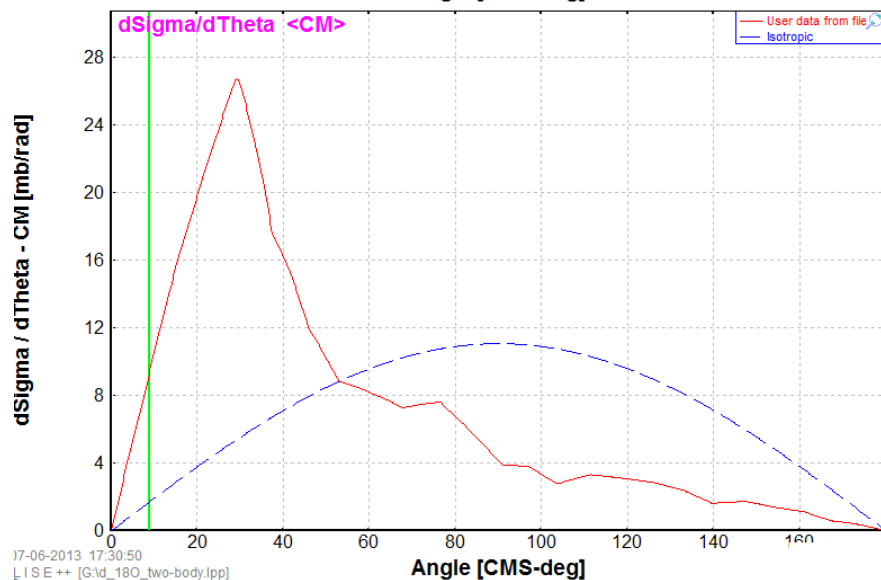
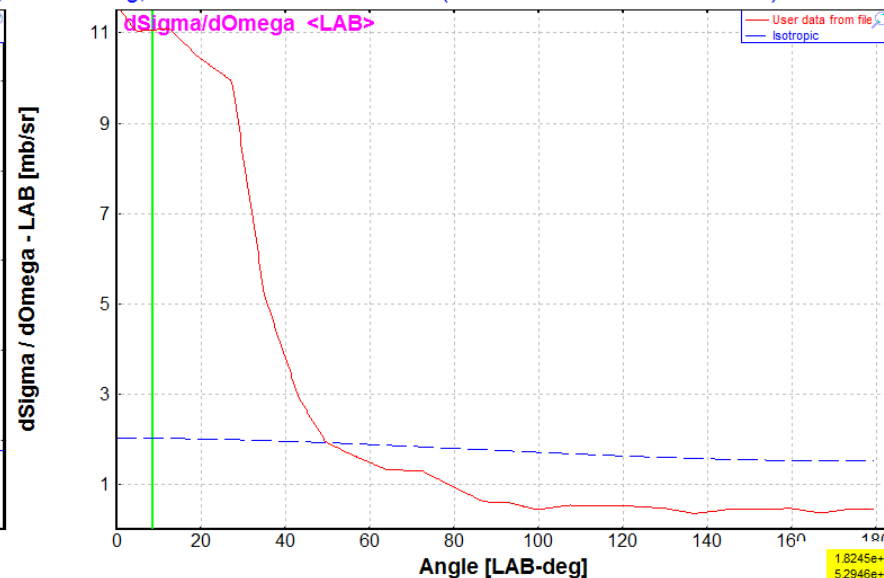
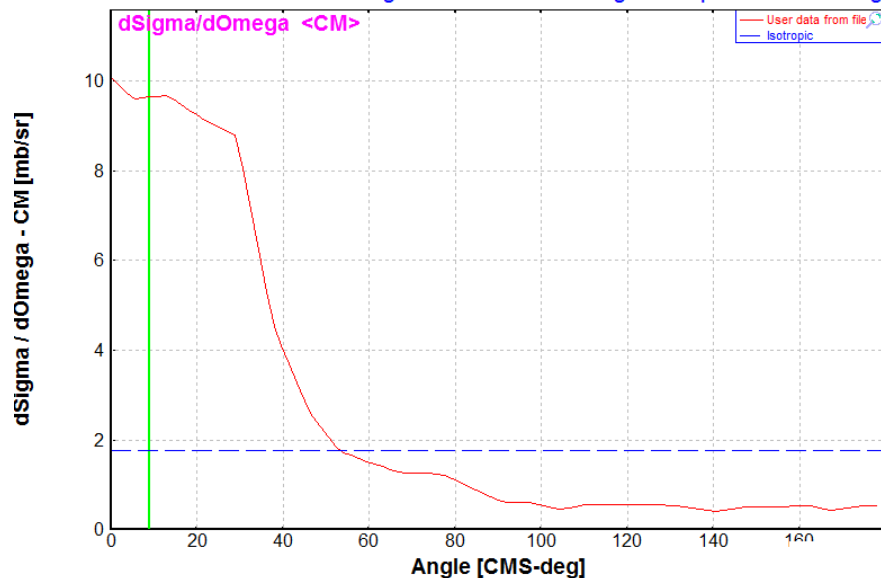
4. The UserDiffCS dialog plots : cross sections (file "19O_gs.txt", E*=0)

Differential Cross Section



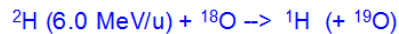
User file: "19O_gs.txt"; Integrated Cross Section: 22.12 mb; Grazing angle in CMS [$^2\text{H}+^{18}\text{O}$]: 9.00 deg

Max.Angle in Lab: 180.00 deg corresponds to CM Angle 180.0 deg; Q reaction : 1.73 MeV (Excitations 0.0+0.0=>0.0+0.0)



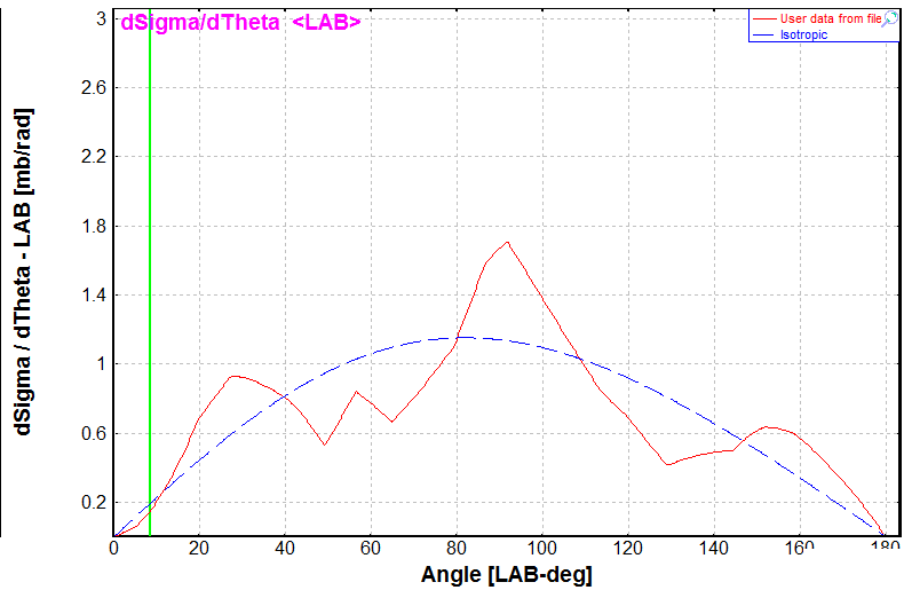
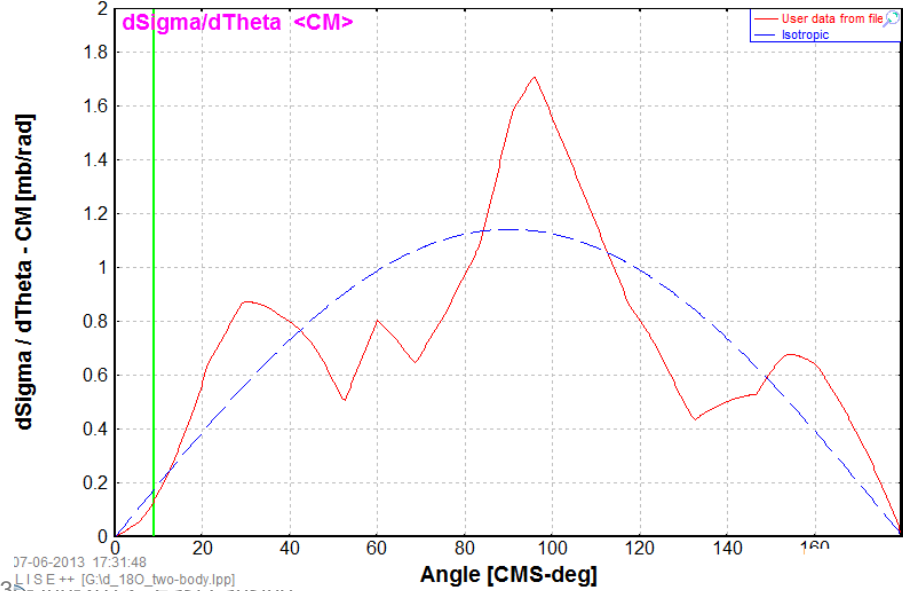
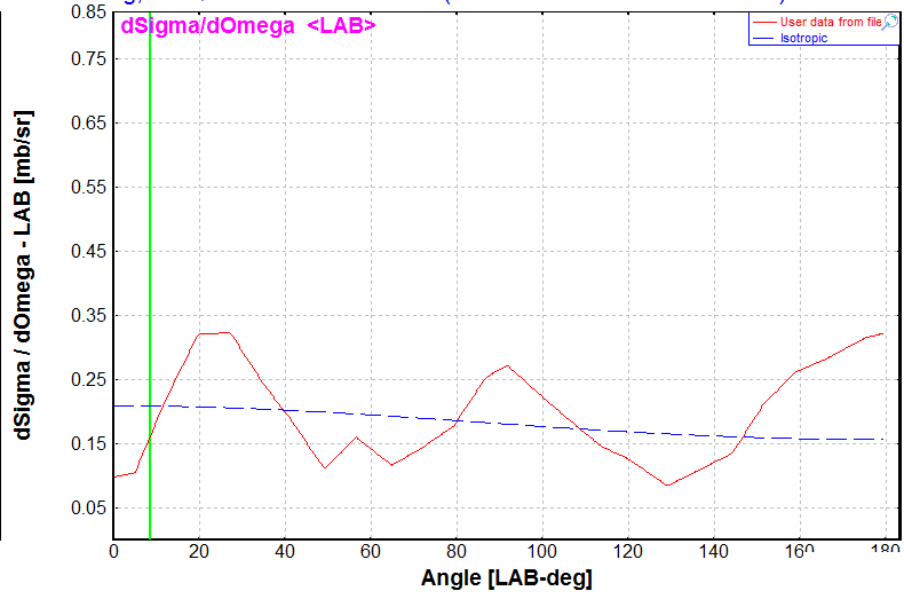
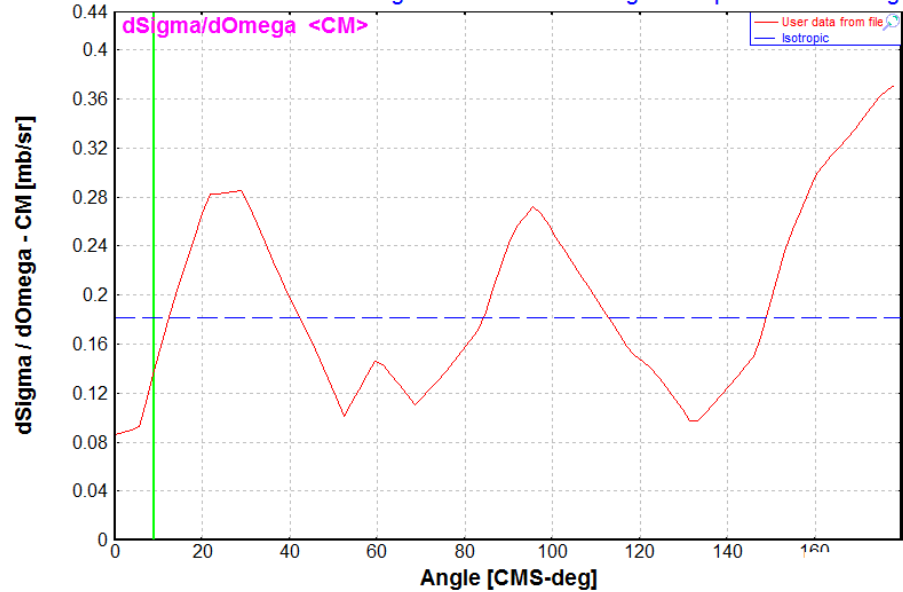
17-06-2013 17:30:50
LISE++ [G:\d_18O_two-body.lpp]

Differential Cross Section



User file: "19O_L0.96.txt"; Integrated Cross Section: 2.286 mb; Grazing angle in CMS [${}^2\text{H}+{}^{18}\text{O}$]: 9.00 deg

Max.Angle in Lab: 180.00 deg corresponds to CM Angle 180.0 deg; Q reaction : 0.77 MeV (Excitations 0.0+0.0=>0.0+1.0)



Inverse for test

Differential cross section file X

180 (6.0 MeV/u) + 2H -> 190 (+ 1H)

Data File

190_L0.96.txt

Number of rows

Data	Comments	Total
22	2	24

Excitation energies of products (MeV)

E* of 190 = E* of 1H =

Integrated Cross Section (mb)

Note

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

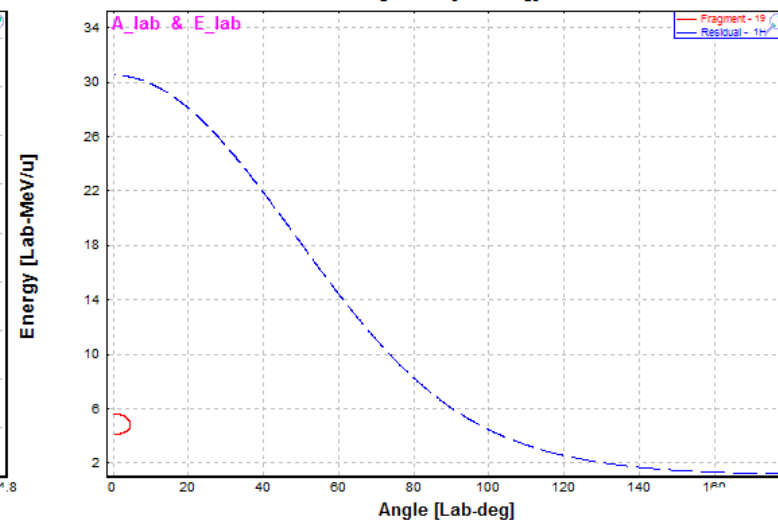
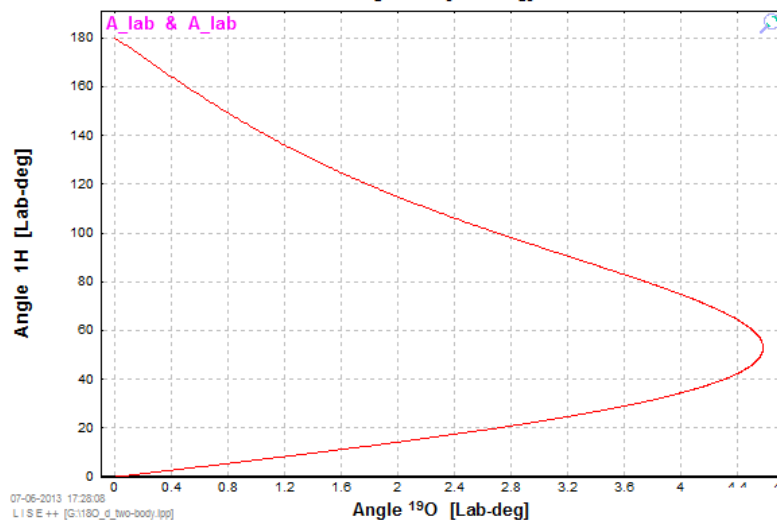
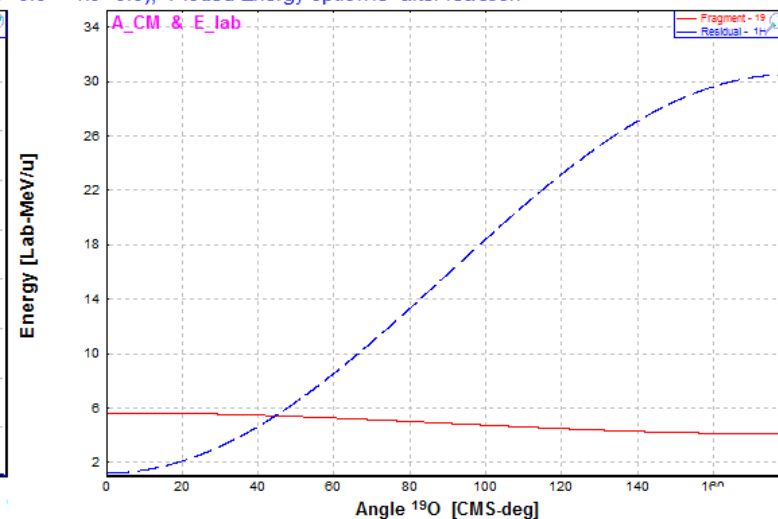
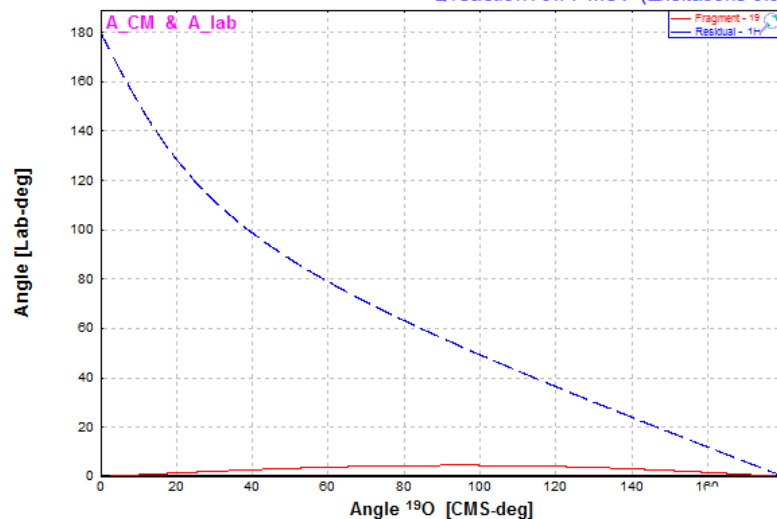
Two columns, where the 1st is Angle in [degrees], the 2nd is Diff.CS in System of Center mass [mb/sr]

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

Inverse for test

Reaction's Kinematics

$^{18}\text{O} + ^2\text{H} \Rightarrow ^{19}\text{O} + ^1\text{H}$ $^2\text{H}(^{18}\text{O}, ^{19}\text{O})^1\text{H}$; Reaction at the "entrance" of the target
 Projectile Energy at the reaction place: 6.00 MeV/u Grazing angle in CMS [$^{18}\text{O} + ^2\text{H}$] = 8.93 deg
 Q reaction : 0.77 MeV (Excitations 0.0+0.0=>1.0+0.0); Plotted Energy option is "after reaction"



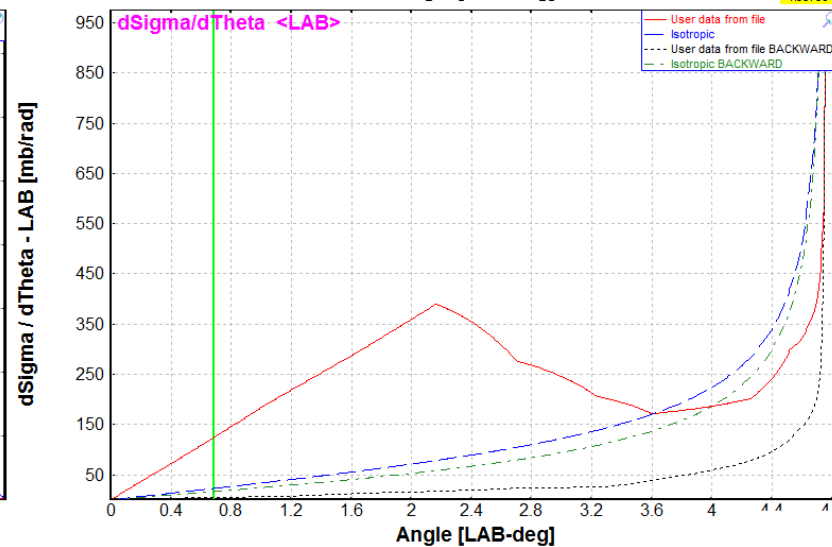
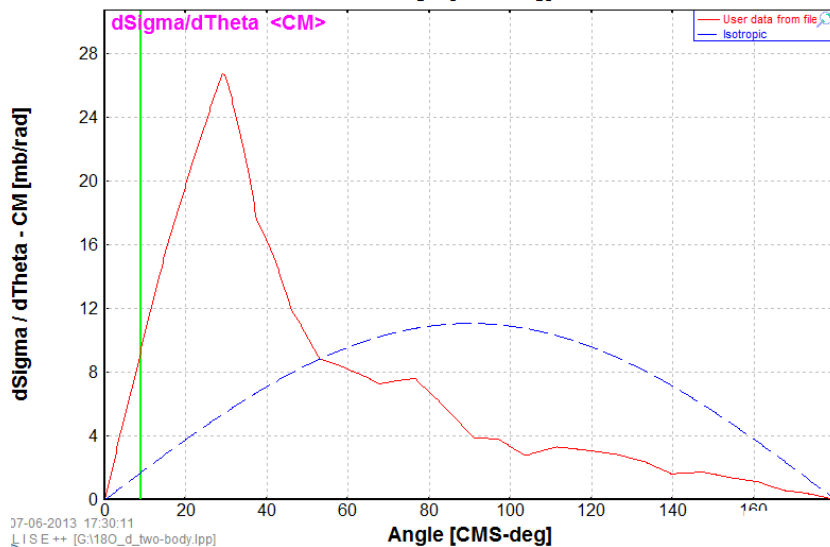
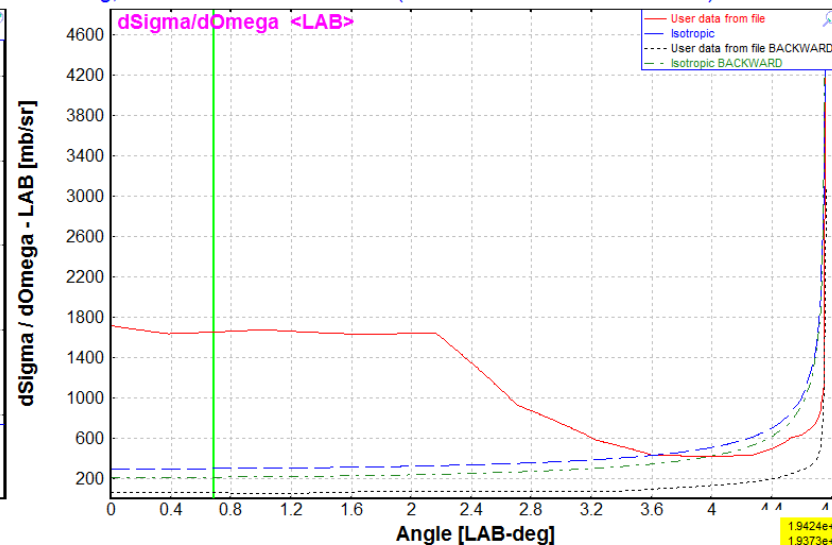
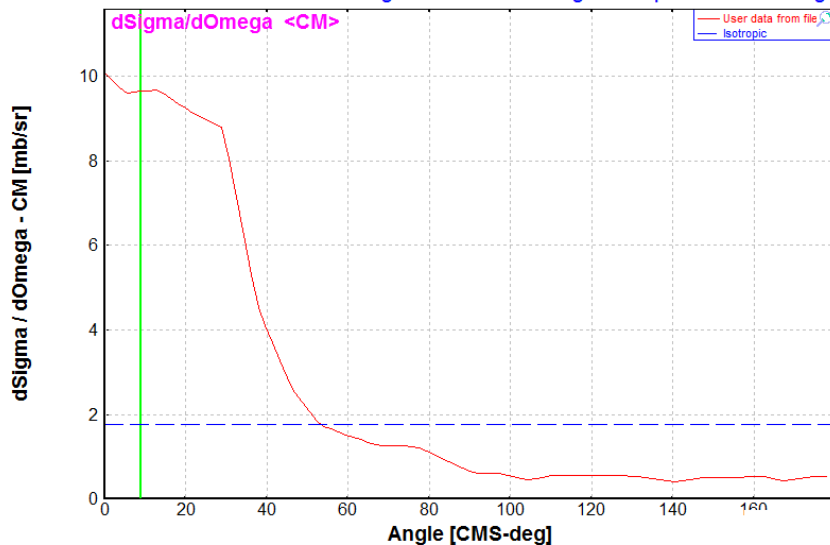
07-05-2013 17:28:05
 LIS E++ [G:\18O_d_two-body.jpg]

Inverse for test

Differential Cross Section

^{18}O (6.0 MeV/u) + ^2H \rightarrow ^{19}O (+ ^1H)

User file: "19O_gs.txt"; Integrated Cross Section: 22.12 mb; Grazing angle in CMS [$^{18}\text{O} + ^2\text{H}$]: 8.93 deg
 Max.Angle in Lab: 4.77 deg corresponds to CM Angle 94.9 deg; Q reaction : 1.73 MeV (Excitations 0.0+0.0=>0.0+0.0)

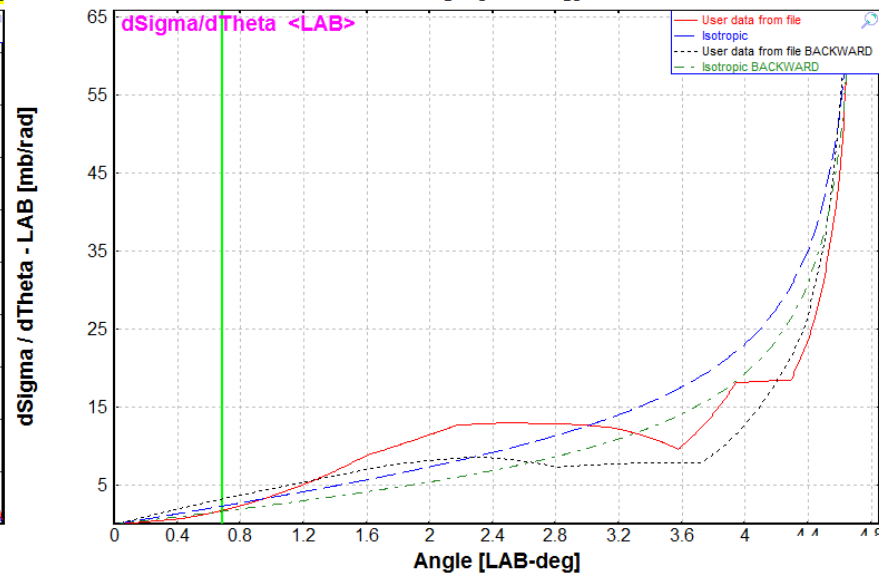
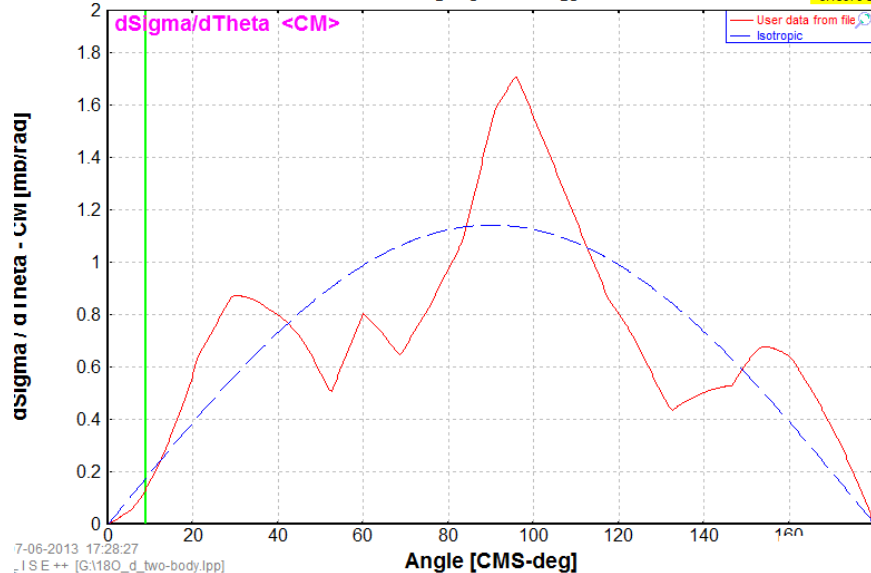
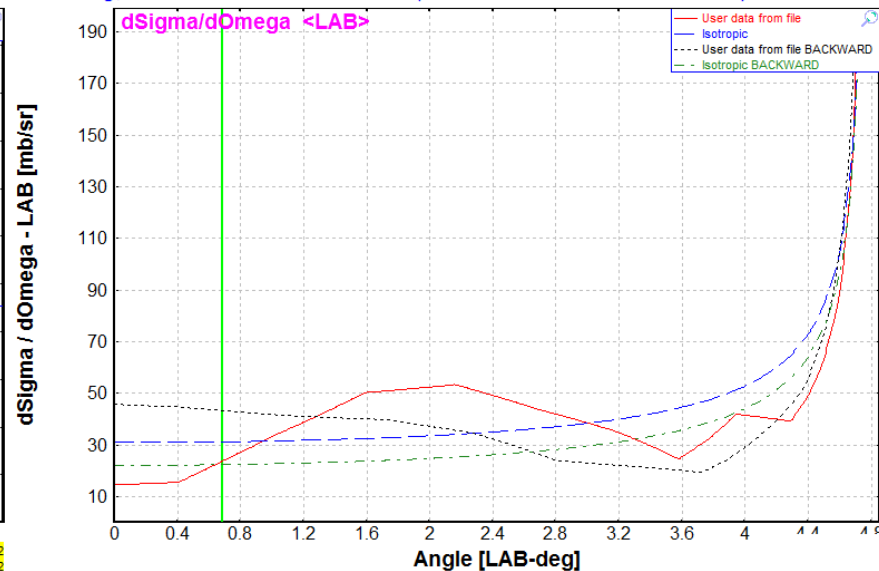
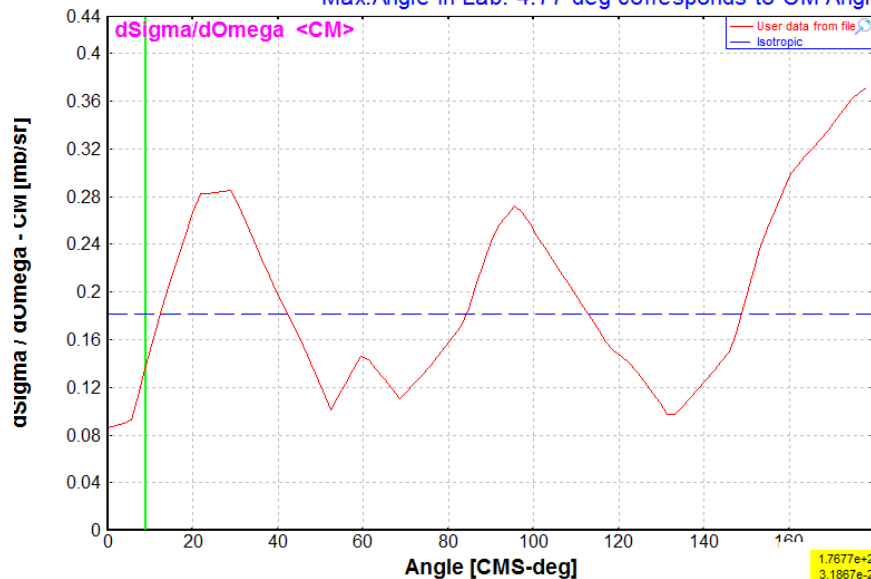


Differential Cross Section

^{18}O (6.0 MeV/u) + ^2H \rightarrow ^{19}O (+ ^1H)

User file: "19O_L0.96.txt"; Integrated Cross Section: 2.286 mb; Grazing angle in CMS [^{18}O + ^2H]: 8.93 deg
 Max.Angle in Lab: 4.77 deg corresponds to CM Angle 94.9 deg; Q reaction : 0.77 MeV (Excitations 0.0+0.0=>1.0+0.0)

Inverse for test



Isotropic

UserDiffCS

Kinematics calculator (relativistic)

Reactions: TWO BODY reaction B (A, C) D

Participants:

A	Beam	2H	13.14	0	Beam energy = 6.0 MeV/u
B	Target	180	-0.78	0	Intensity = 1 pA
C	Fragment	1H	7.29	0	Target thickness = 1e-1 micron
D	Residual	190	3.33	0	Q-value = 1.73 MeV

Reaction takes place at the: ENTRANCE of the target MIDDLE of the target EXIT of the target

Set-up: Search an angle in CM: from 0 degrees and up from 180 degrees and down

Angle (deg) = 46.97 47.453 50 130

Calculations: LAB CM

Counting in monitor =	6.56e-2	5.12e1	pps
Differential Cross Section =	110	833	100 100 mb/sr
Energy after reaction =	12.94	0.0361	11.793 0.03 MeV/u**
Energy at the entrance of detectors =	12.94	0.0343	MeV/u (** for gamma [MeV])
Maximum Angle =	100.00	47.99	deg
Solid Angle =	0.2	0.2	0.22 1.72 msr
delta Theta =	0.57	0.57	0.6 4.8 deg

Buttons: Kinematics plots, Diff CS converter, 2D fragment plot (Monte Carlo), 3-body kinematics

Kinematics calculator (relativistic)

Reactions: TWO BODY reaction B (A, C) D

Participants:

A	Beam	2H	13.14	0	Beam energy = 6.0 MeV/u
B	Target	180	-0.78	0	Intensity = 1 pA
C	Fragment	1H	7.29	0	Target thickness = 1e-1 micron
D	Residual	190	3.33	0	Q-value = 1.73 MeV

Reaction takes place at the: ENTRANCE of the target MIDDLE of the target EXIT of the target

Set-up: Search an angle in CM: from 0 degrees and up from 180 degrees and down

Angle (deg) = 46.97 47.453 50 130

Calculations: LAB CM

Counting in monitor =	6.56e-2	5.12e1	pps
Differential Cross Section =	110	833	100 100 mb/sr
Energy after reaction =	12.94	0.0361	11.793 0.03 MeV/u**
Energy at the entrance of detectors =	12.94	0.0343	MeV/u (** for gamma [MeV])
Maximum Angle =	100.00	47.99	deg
Solid Angle =	0.2	0.2	0.22 1.72 msr
delta Theta =	0.57	0.57	0.6 4.8 deg

Buttons: Kinematics plots, Diff CS converter, 2D fragment plot (Monte Carlo), 3-body kinematics

Differential cross section file

2H [6.0 MeV/u] + 180 -> 1H [+190]

Data File: 190_gs.txt

Number of rows: Data 23, Comments 2, Total 25

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

Integrated Cross Section (mb): 22.12

Utilities: Kinematics Plots, 2D Kinematics (MC)

2D fragment plot (Monte Carlo)

TWO BODY reaction

Projectile: 2H [6.0 MeV/u], Target: 180

Fragment (C): 1H, Residual (D): 190, Q-value (MeV): 1.73 MeV

Excitations: take from systematics

Acceptances (in case of C_final fragment plot): Angular Acceptance: Ellipse Rectangle . Value: Horizontal ± 10000, Vertical ± 10000, Variance: 0.5 mrad. Energy acceptance: Setting energy 5.958 MeV/u, Acceptance ± 1000 %.

Expected final fragments: C_final: 1H, D_final: 190

Fragment to plot: Expected final (C_final)

Initial emittance: Horizontal Angular ± 1 mrad, Vertical Angular ± 1 mrad, Energy ± 0 MeV/u

Plots: Lab: Vz & Vx, Vz & Vy, Ax & Ay, Vz & phi, Vz & Ax, Vz & Ay, E & A, E & Ax, E & Ay, CM: Vz & Vx, A & phi, Ax & Ay

Angular Distribution (CM) ISOTROPIC

2D fragment plot (Monte Carlo)

TWO BODY reaction

Projectile: 2H [6.0 MeV/u], Target: 180

Fragment (C): 1H, Residual (D): 190, Q-value (MeV): 1.73 MeV

Excitations: take from systematics

Acceptances (in case of C_final fragment plot): Angular Acceptance: Ellipse Rectangle . Value: Horizontal ± 10000, Vertical ± 10000, Variance: 0.5 mrad. Energy acceptance: Setting energy 5.958 MeV/u, Acceptance ± 1000 %.

Expected final fragments: C_final: 1H, D_final: 190

Fragment to plot: Expected final (C_final)

Initial emittance: Horizontal Angular ± 1 mrad, Vertical Angular ± 1 mrad, Energy ± 0 MeV/u

Plots: Lab: Vz & Vx, Vz & Vy, Ax & Ay, Vz & phi, Vz & Ax, Vz & Ay, E & A, E & Ax, E & Ay, CM: Vz & Vx, A & phi, Ax & Ay

Angular Distribution (CM) USER'S FILE

Differential cross section file

2H (6.0 MeV/u) + 18O -> 1H (+19O)

Data File

Load from file View data Clear data

19O_gs.txt

Number of rows	Data	Comments	Total
	23	2	25

Excitation energies of products (MeV)

E* of 1H = 0 E* of 19O = 0

Integrated Cross Section (mb)

22.12

Utilities

- Kinematics Plots
- 2D Kinematics (MC)
- Dif. Cross Section Plots

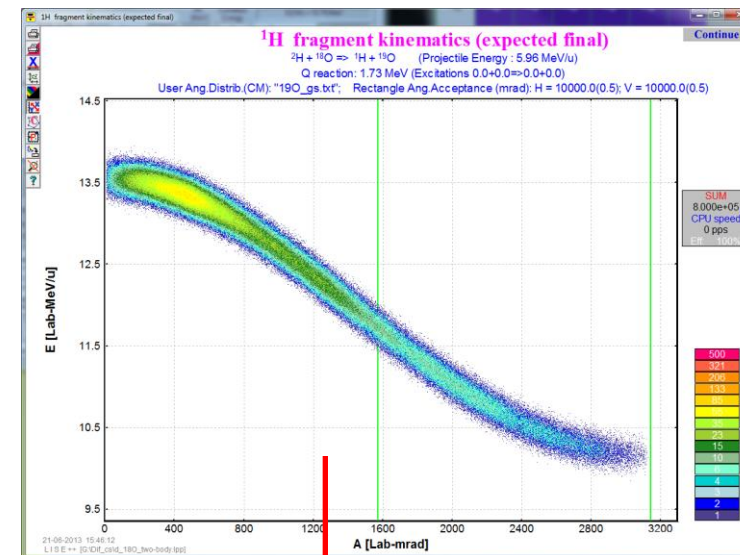
Note

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

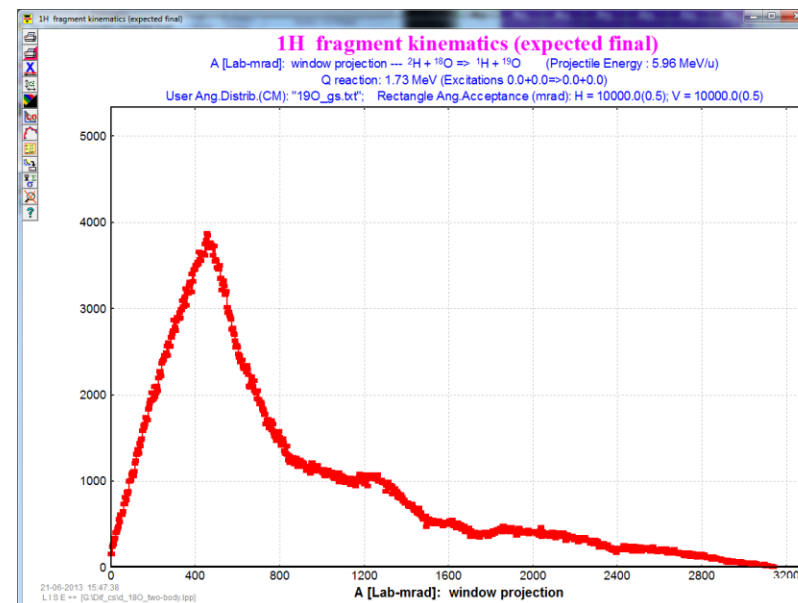
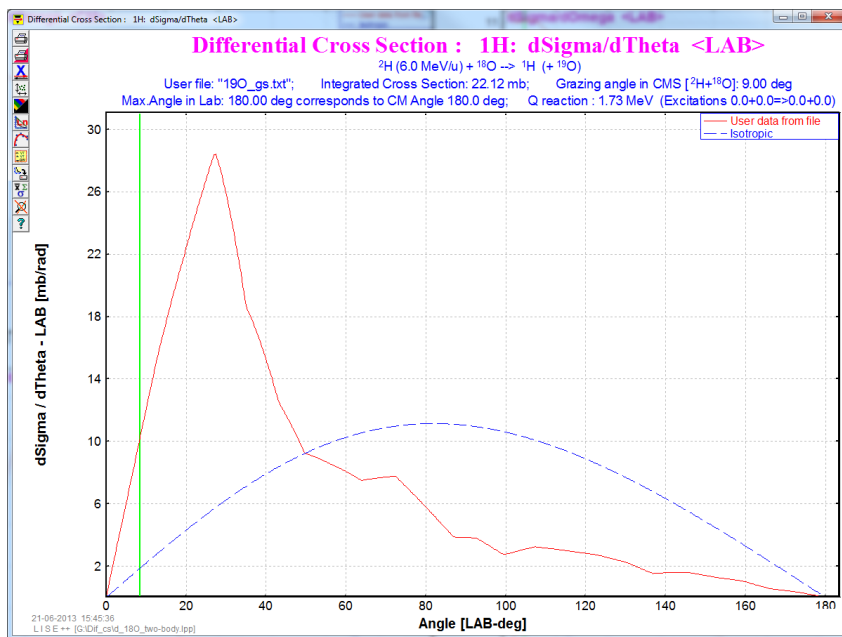
Two columns, where the 1st is Angle in [degrees], the 2nd is Diff.CS in System of Center mass [mb/sr]

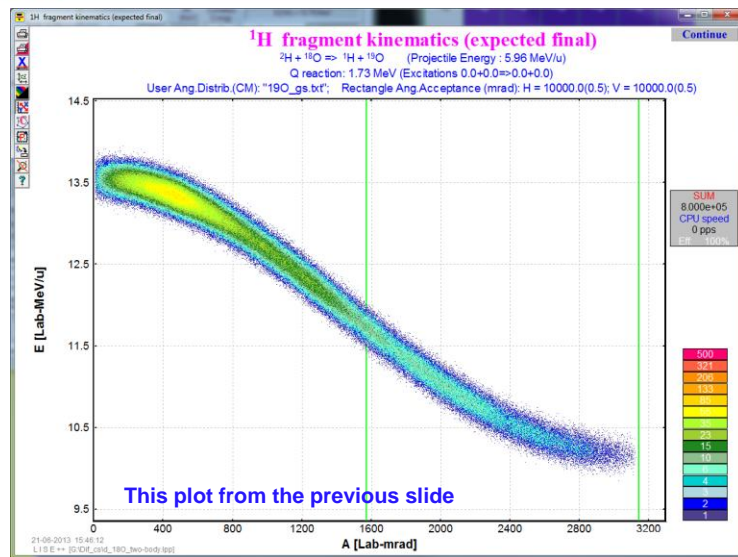
The columns can be separated by a Space, a Comma or a Tabulation. User can put comments also at the end of data line

Quit Help

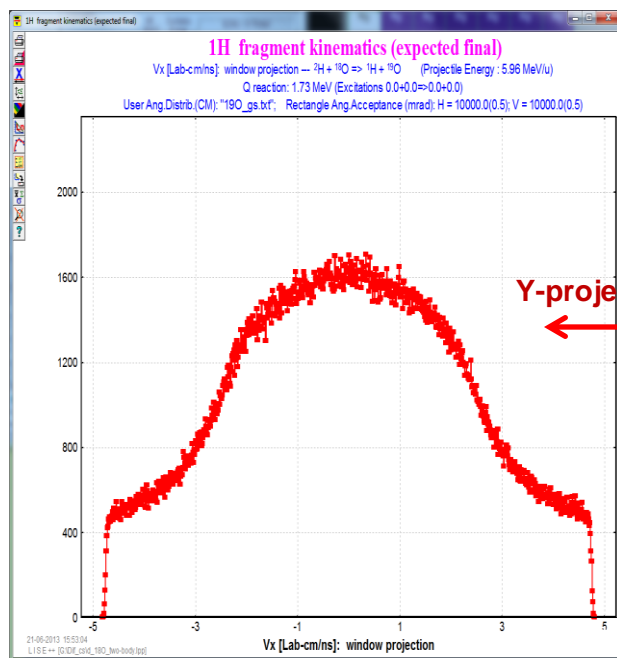
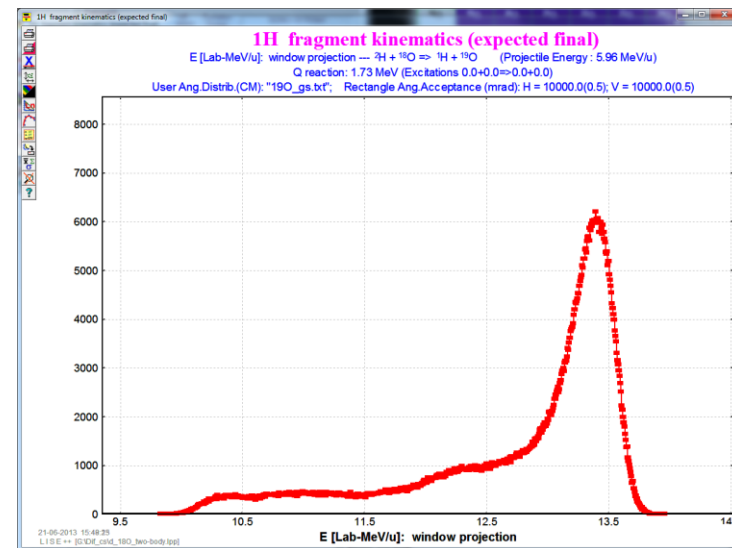


X-projection

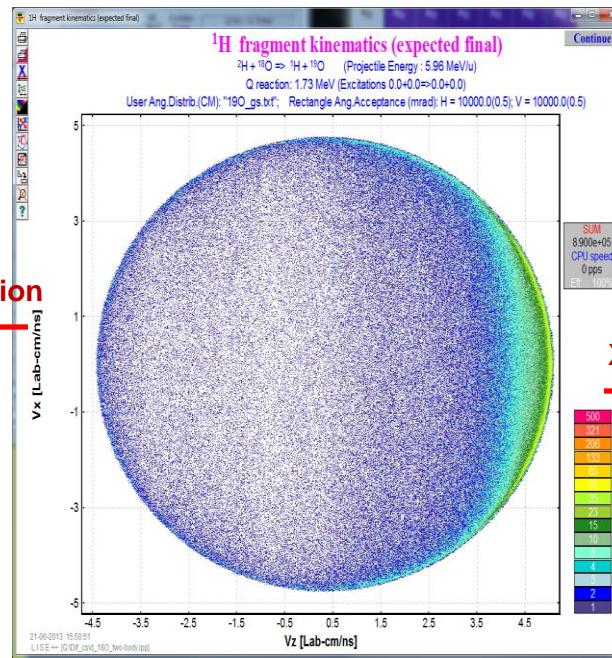




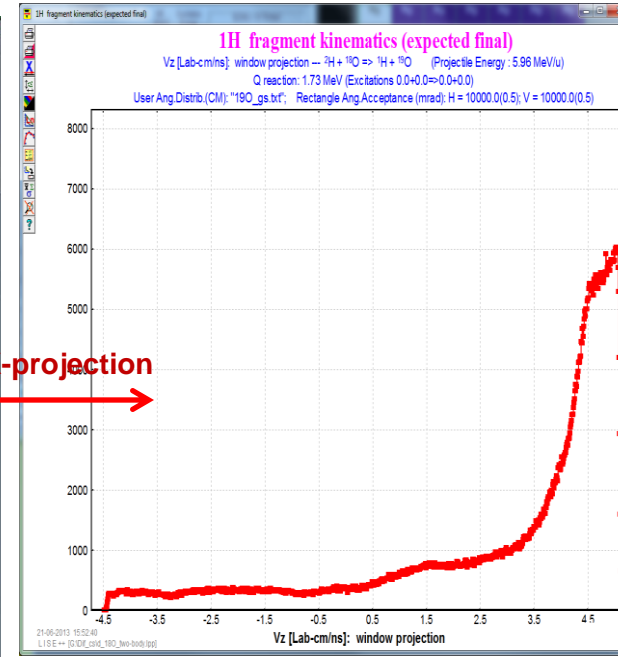
Y-projection



Y-projection



X-projection



Differential cross section file

2H (6.0 MeV/u) + 18O -> 1H (+190)

Data File

Load from file View data Clear data

190_L0.96.txt

Number of rows		
Data	Comments	Total
22	2	24

Excitation energies of products (MeV)

E* of 1H = 0 E* of 190 = 0.96

Integrated Cross Section (mb)

2.286

Dif. Cross Section Plots

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]

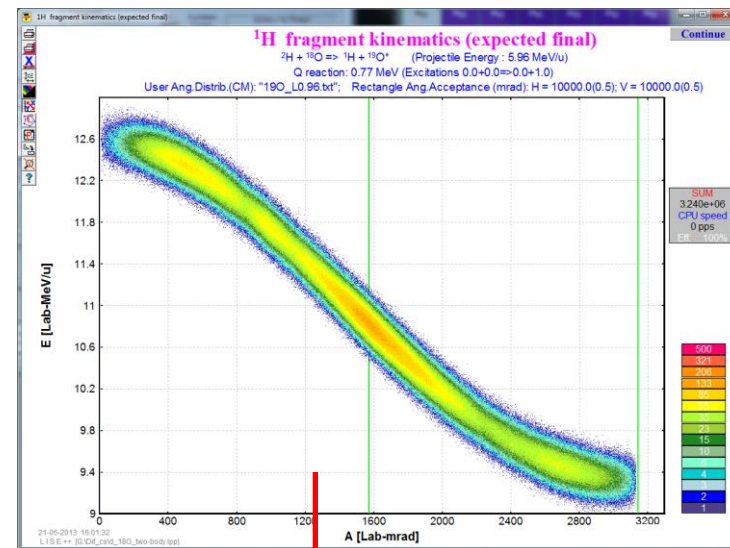
The columns can be separated by a Space, a Comma or a Tabulation. User can put comments also at the end of data line

Utilities

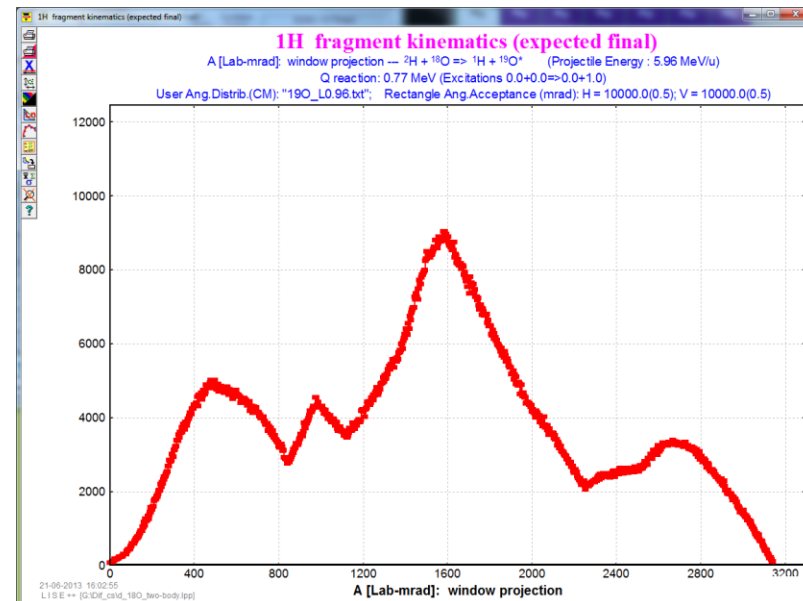
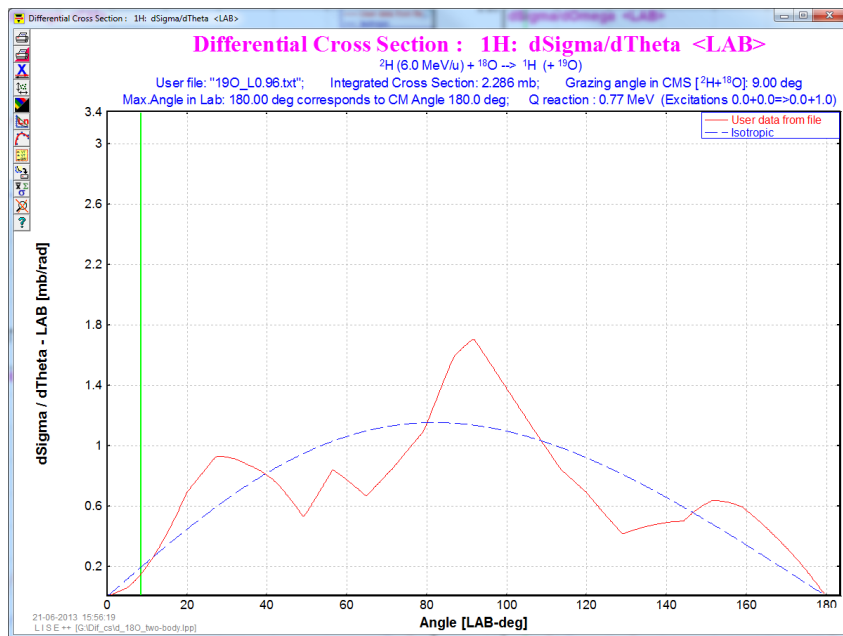
Kinematics Plots

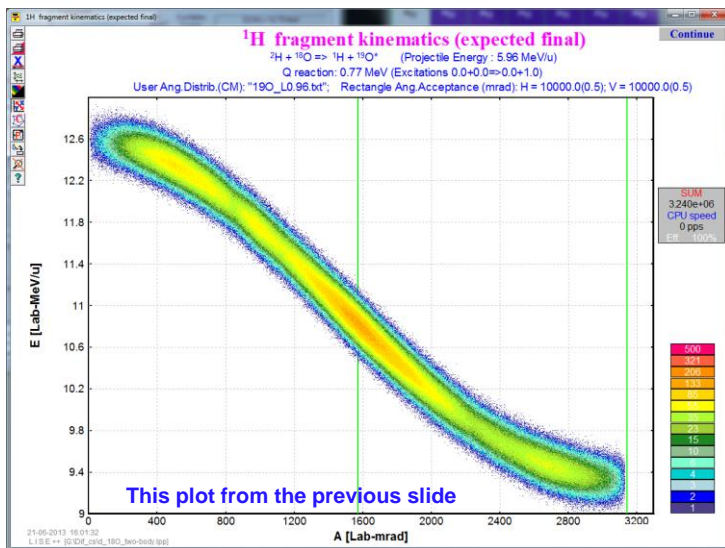
2D Kinematics (MC)

Quit Help

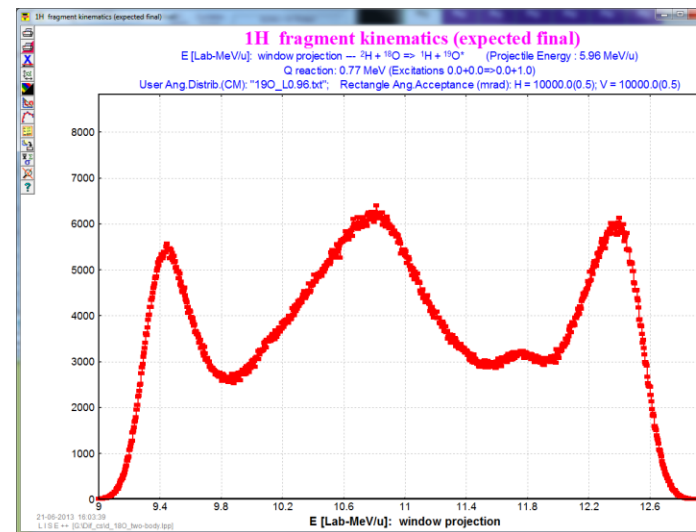


X-projection

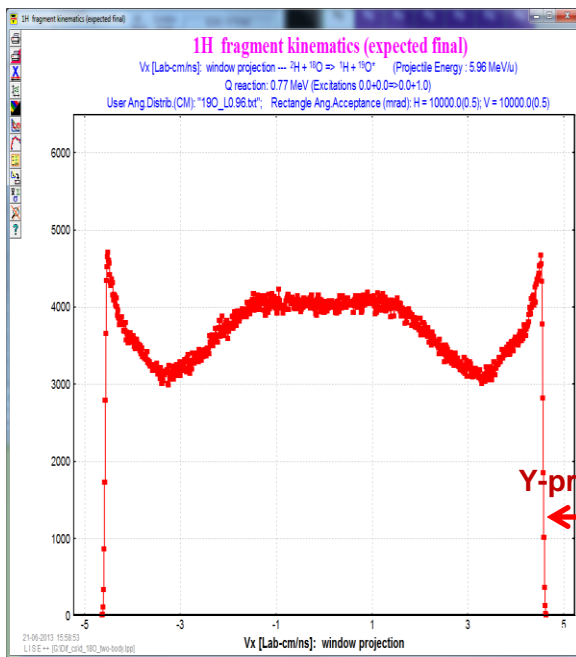




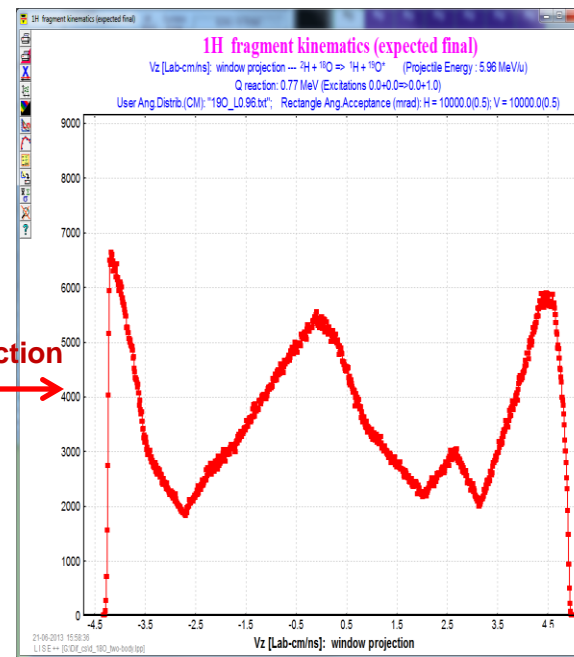
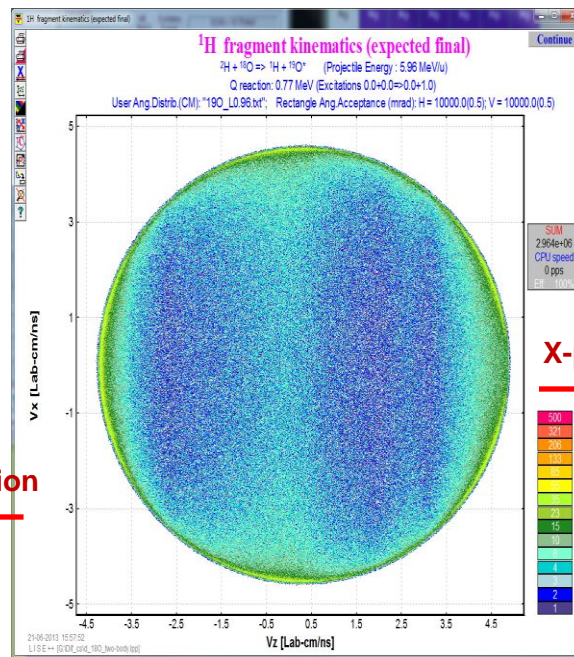
Y-projection

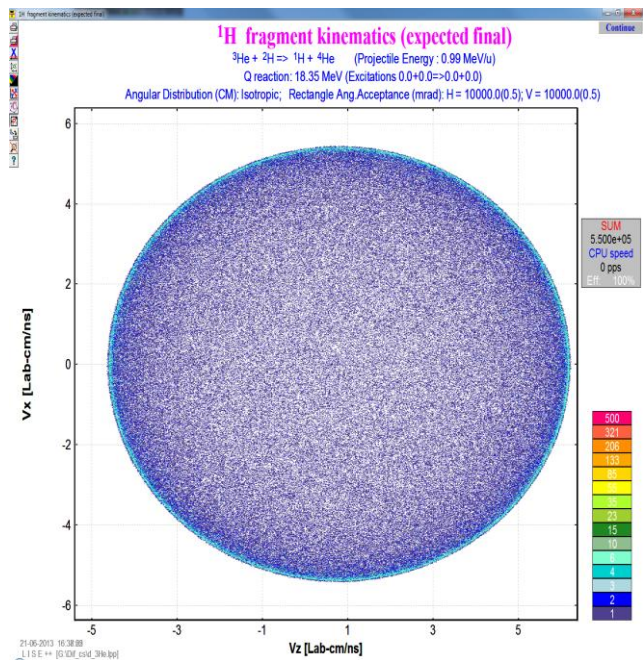


X-projection

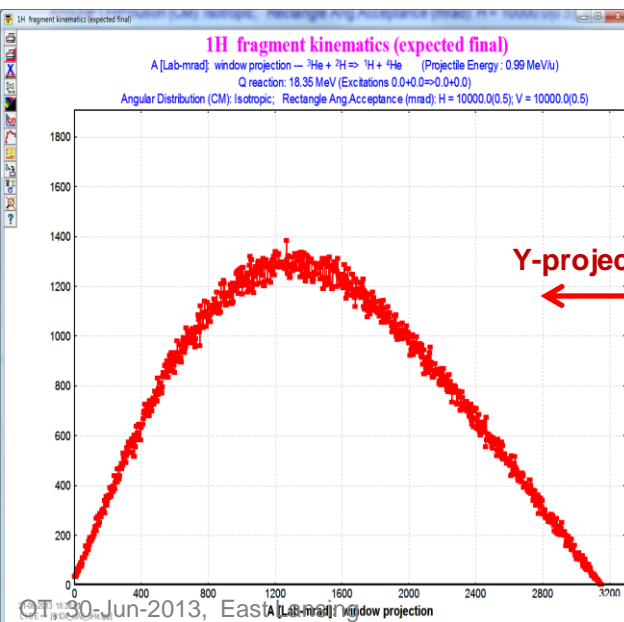
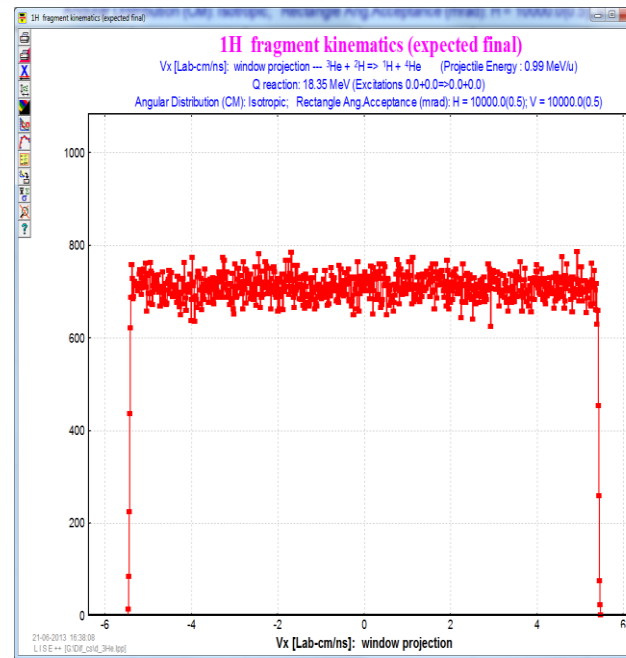


Y-projection

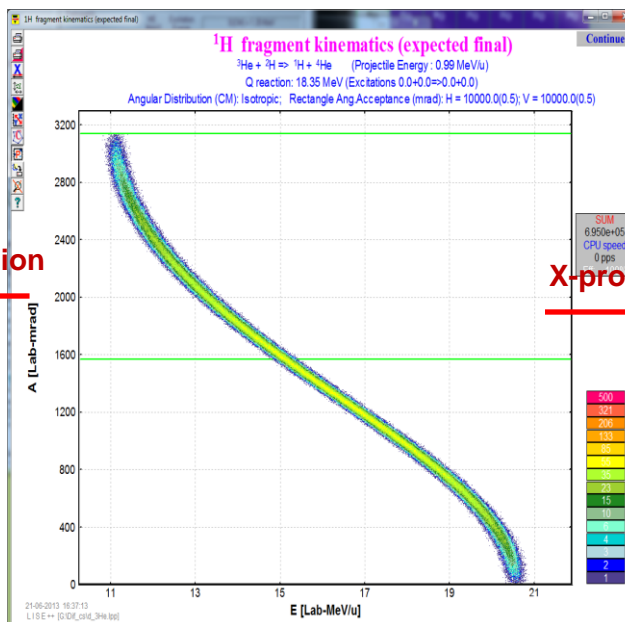




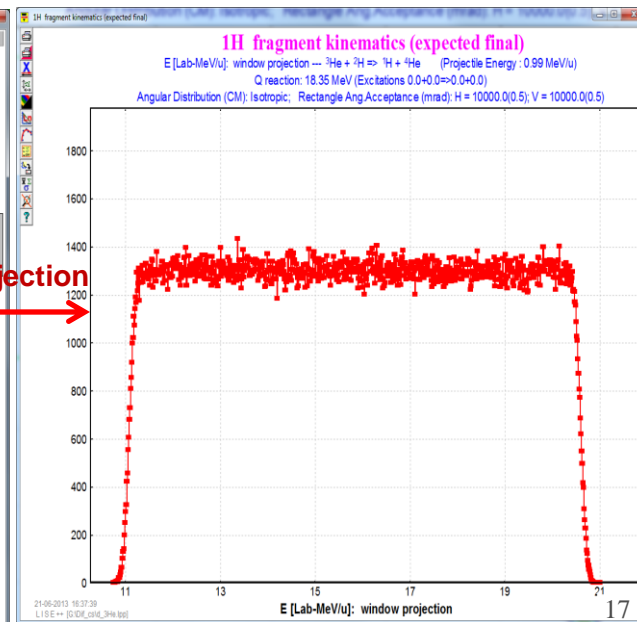
Y-projection



Y-projection



X-projection



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 (- no file -)
- Input ions rays from file emitted from target (- no file -)

Chose fragment of interest

A: 1, Element: H, Z: 1

Charge states: No charge states

Reaction mechanism: Projectile Fragmentation

MC transmission options

Velocity: **Velocity_Z [cm/ns]**

Ion parameters (M,Z,q...): A [mass number]

X-coordinate After BLOCK

Y-coordinate After BLOCK

Gate 1, Gate 2, Gate 3, Gate 4

Velocity [cm/ns]
 Velocity_Z [cm/ns]
 Velocity_X [cm/ns]
 Velocity_Y [cm/ns]
 Velocity_XY [cm/ns]

Gate for Monte Carlo calculation transmission

Coordinate After BLOCK

Status (Condition): "AND"

Gate: v1 = -100, v2 = 100

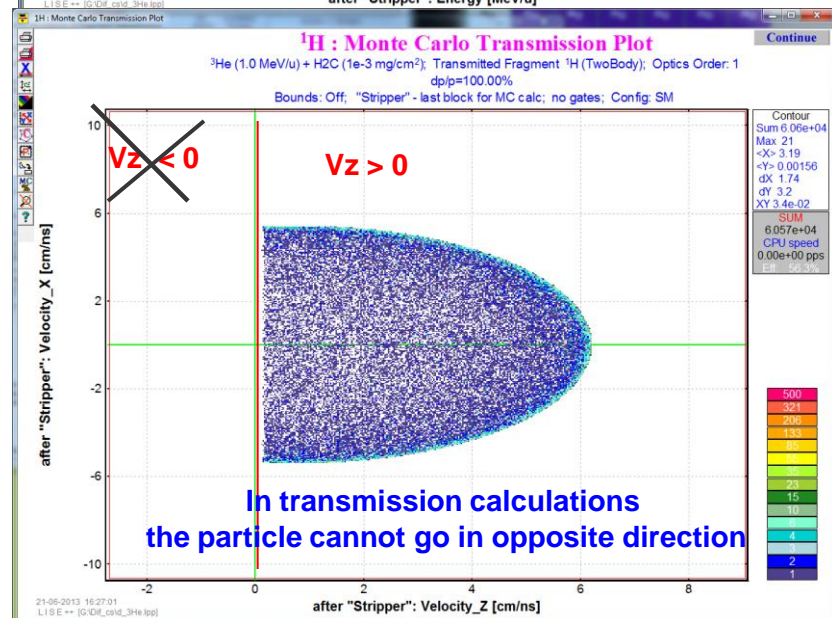
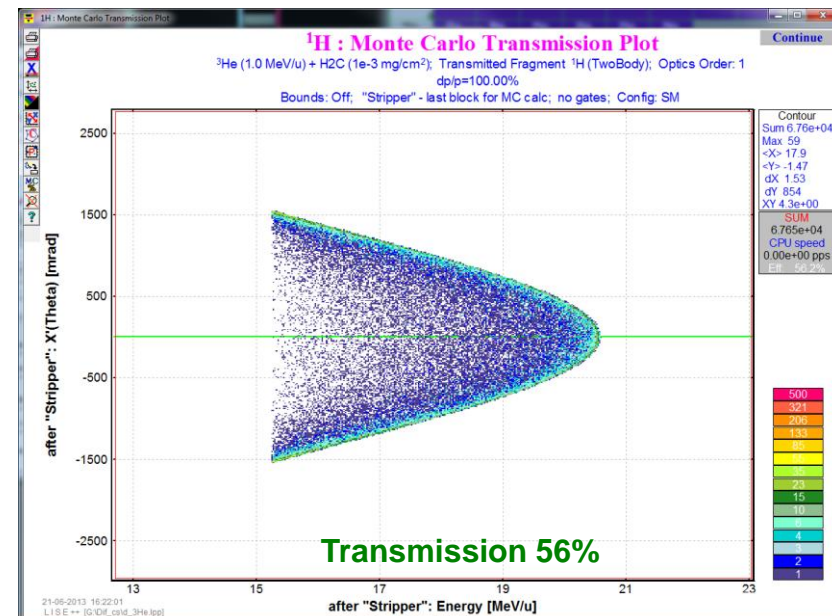
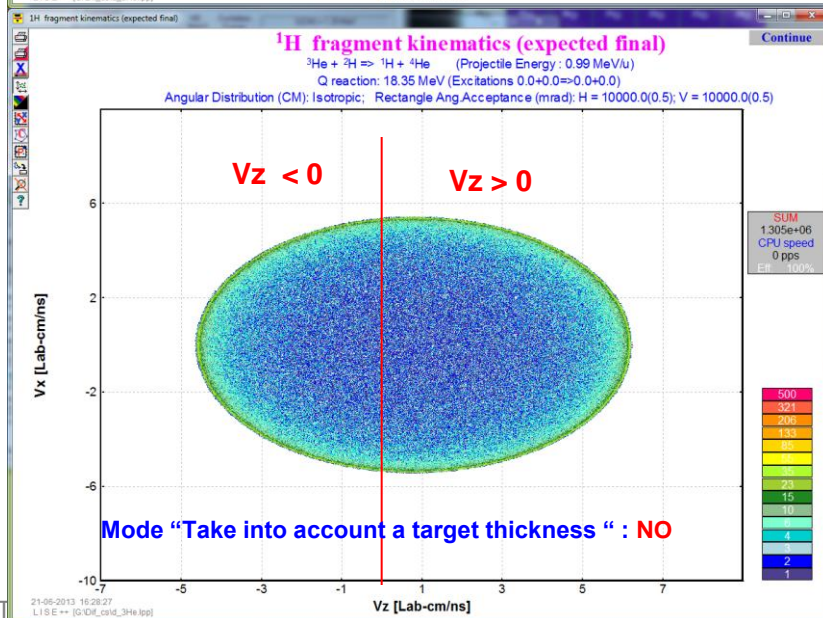
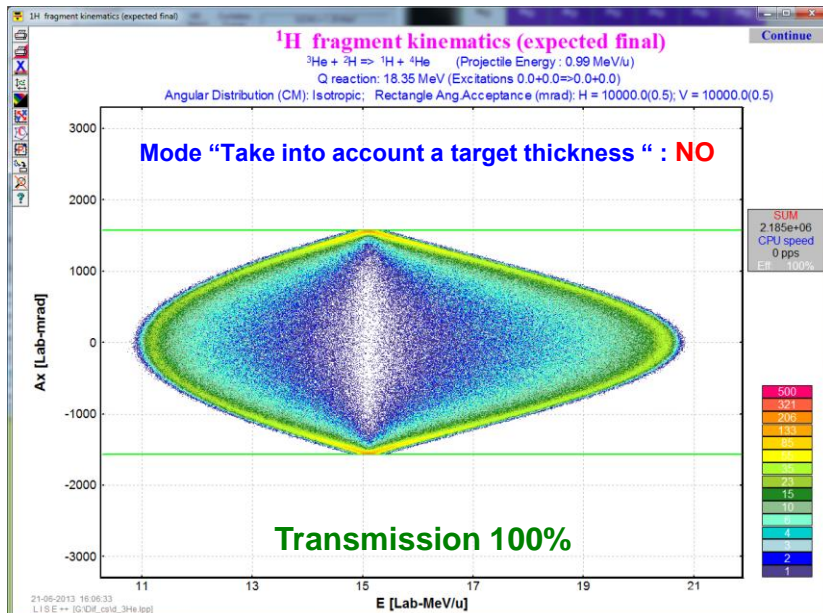
Velocity: **Velocity [cm/ns]**

Ion parameters (M,Z,q...): Mass (amu)

MC Kinematics

Very thin target, two-body reaction

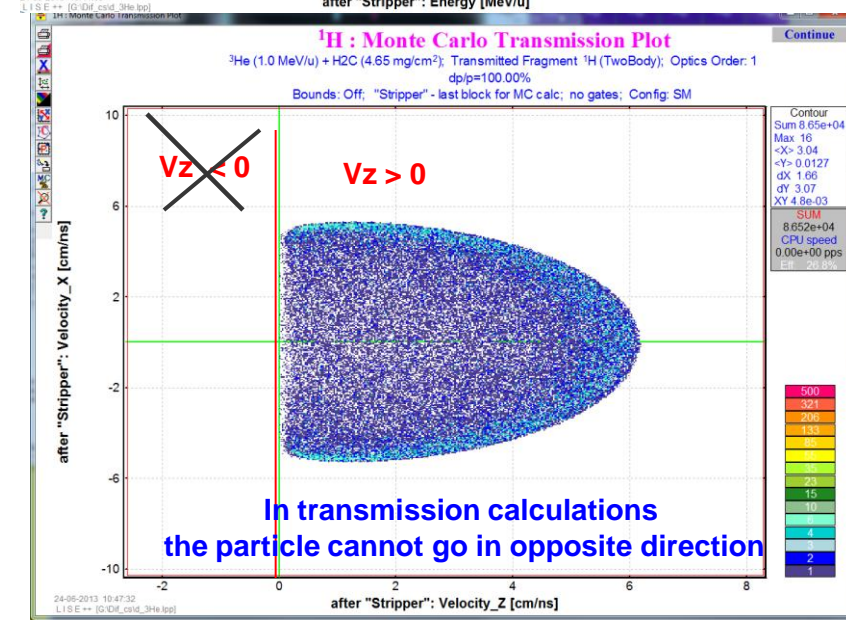
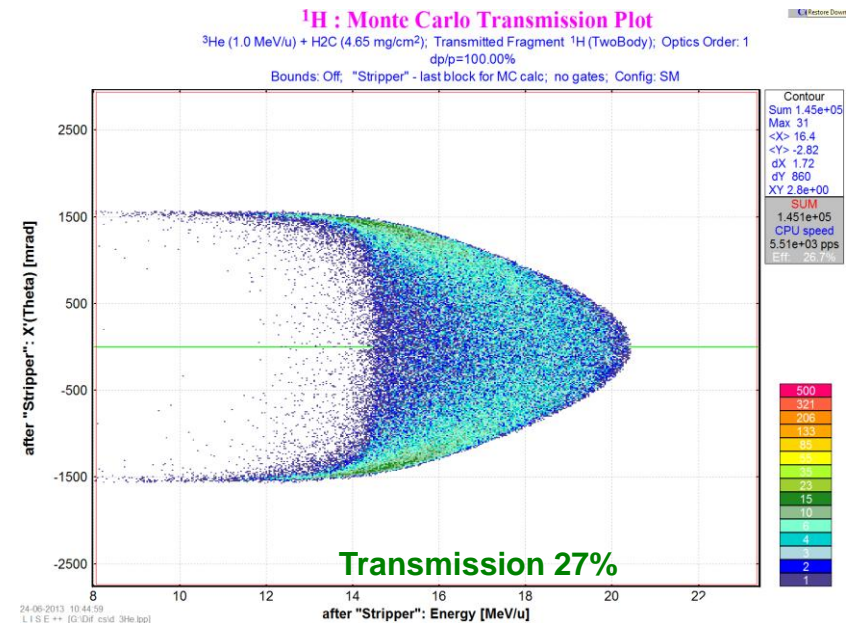
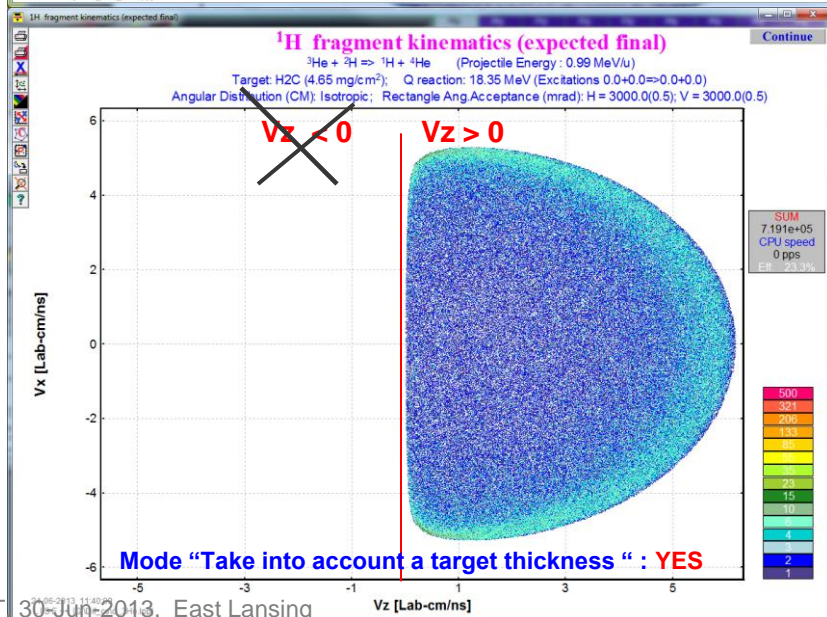
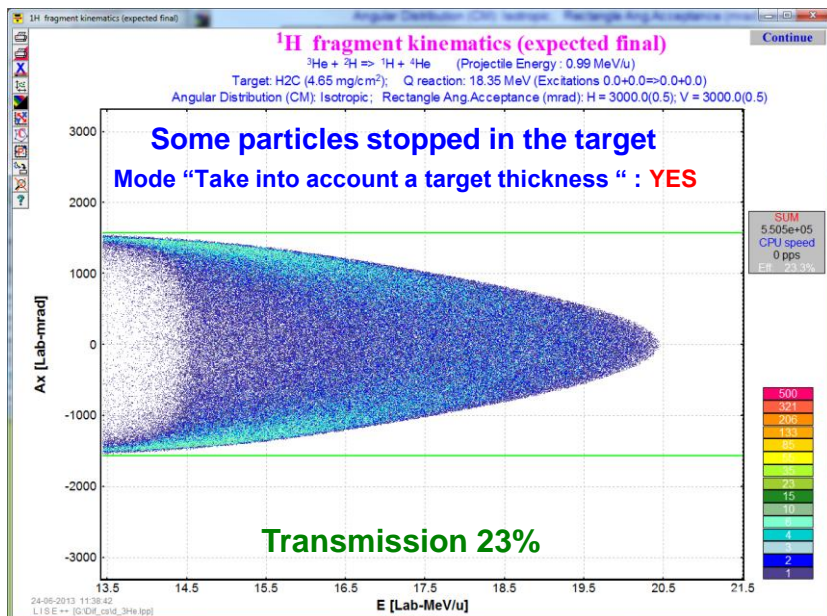
MC Transmission



MC Kinematics

4.65 mg/cm² target, two-body reaction

MC Transmission



8. Loading UserDiffCS in LISE++

Options Calculations Utilities 1D-Plot 2D-Plot Databases

Preferences

- Production Mechanism
- Evaporation options
- Excitation energy of prefragment
- Fission Barrier
- User Cross Sections**
- User Cross Sections from File
- Options of Fragment Production in Material (wedge)
- Secondary Reactions in target
- Isotopes

Two body reaction

A	Element	Z
1	H	1

Reaction: 2H + 0

Number of saved cross sections:

All CS	Int CS	Dif CS
All reactions: 0	0	0
this reaction: 0	0	0

Input (View) Dif CS

Differential cross section file

2H (6.0 MeV/u) + 18O -> 1H (+190)

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

Number of rows: Data, Comments, Total

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

Integrated Cross Section (mb):

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

Two body reaction

A	Element	Z
1	H	1

Reaction: 2H + 0

Number of saved cross sections:

All CS	Int CS	Dif CS
All reactions: 1	0	1
this reaction: 1	0	1

Input (View) Dif CS: 190_gs.txt

Differential cross section file

2H (6.0 MeV/u) + 18O -> 1H (+190)

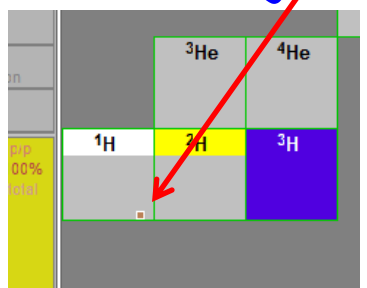
Data File: Load from file, View data, Clear data

Number of rows: Data, Comments, Total

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

Integrated Cross Section (mb): 22.12

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



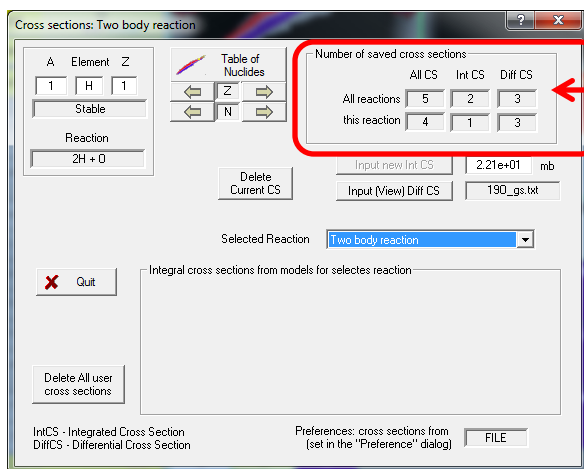
statistics: 1H

1H	Stable (Z=1, N=0)	Hydrogen
AME2012 index	1000	error
Mass excess, [MeV]	7.2890	0.0000
Binding energy	0.0000	0.0000
Beta- decay	-777.0000	-777.0000
Beta+ decay	-0.7823	-777.0000
S (2n)	*	*
S (2p)	*	*
Q (alpha)	*	*
S (n)	*	*
S (p)	0.0000	0.0000
<Stable> Abundance:	99.99%	

Reaction: 2H + 18O -> 1H + 19O 1.73 MeV (error=0.0026 MeV)

N=0 user cross section : 2.21e+01 (0.00e+00)mb for Two body reaction [Diff. CS]

User CS sign



Information about User CSs

User CSs are saved to LISE++ files and retrieved at reading of LISE++ files

LISE++ file

```
[cs_file]
  UserDiffCS = 3 ; Number of User Diff CS saved in this file
  AppendOverwrite = 1
  AttachedInside = 1
```

```
180 0.2
[DiffCS0002]
CorrelatedTo=3
Filename=190_L0.96.txt
Comment= J.Wiza et al., PhysRev 143 (1966) 676 -- Level 0.96 180(p,d)190"
Ex12 = 0.000 0.960
NofPoints = 24
0 0.0857232
5.2971 0.0913
13.246 0.1935
21.196 0.2818
29.156 0.2849
37.123 0.2183
45.09 0.1611
52.299 0.1007
59.875 0.1487
68.598 0.11
75.418 0.1364
83.374 0.1735
90.946 0.2525
95.871 0.2742
...
```

Initial conditions

Beam

A Element q+

 Z
 Stable
 Table of Nuclides

Beam energy
 Energy 5.958 MeV/u
 TKE 12 MeV
 Brho 0.7089 Tm
 P 0.213 GeV/c
 U 1.2e+4 KV

Beam intensity
 1 enA
 1 pnA
 6.25e+9 pps
 1.192e-5 KW

Emitance
 Beam CARD (sigma, semi-axis, half-width...)
 1D - shape (Distribution method)
 2D mode

1. X mm	1	Gaussian	<input type="checkbox"/>
2. T mrad	6	Gaussian	<input type="checkbox"/>
3. Y mm	1	Gaussian	<input type="checkbox"/>
4. P mrad	8	Gaussian	<input type="checkbox"/>
5. L mm	0	Gaussian	<input type="checkbox"/>
6. D %	0.07	Gaussian	<input type="checkbox"/>

Energy Loss in the target box [KW] 7.51e-11

Differential cross section file

2H (6.0 MeV/u) + 18O -> 1H (+19O)

Data File

190_gs.txt

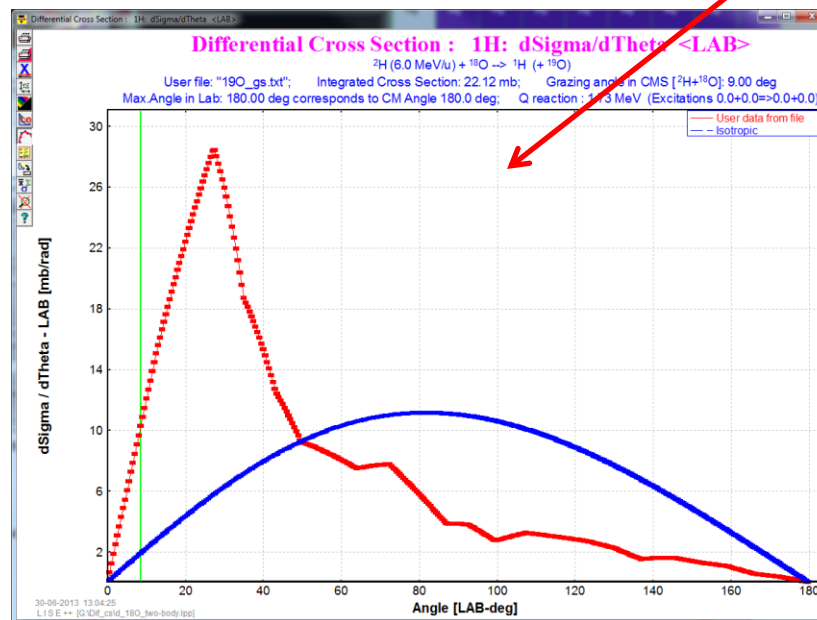
Number of rows
 Data: 23, Comments: 2, Total: 25

Excitation energies of products (MeV)
 E* of 1H = 0, E* of 19O = 0

Integrated Cross Section (mb) 22.12

Note
 The Differential Cross Section file is in ASCII format. Comment string begins 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.

Utilities



See the next slide for MC calculations

LISE++ File d_3He.lpp
DiffCS File 190_gs.txt

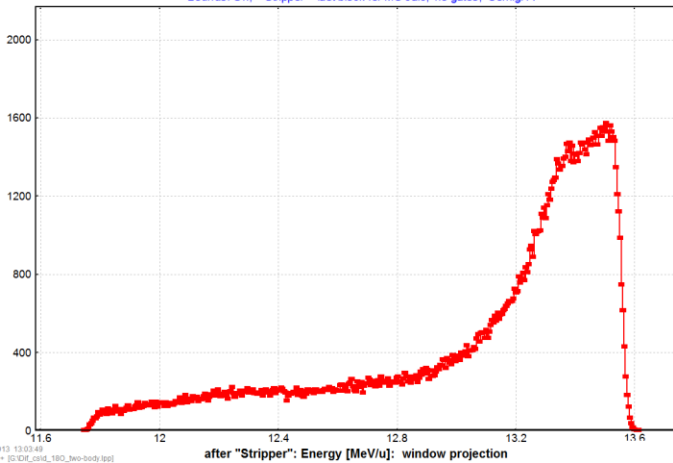
Continue

¹H : Monte Carlo Transmission Plot

²H (6.0 MeV/u) + O (1e-2 μm); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
dp/p=100.00%
Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: A

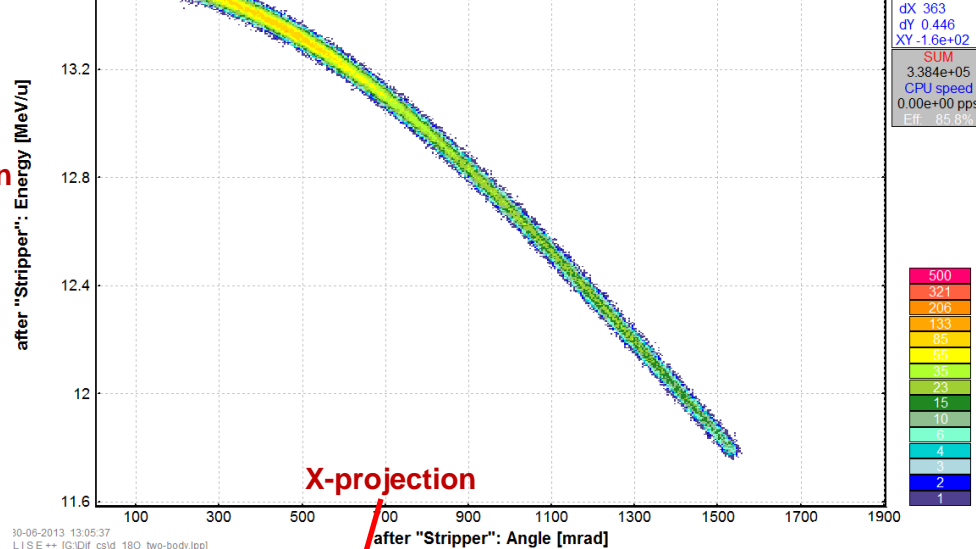
¹H : Monte Carlo Transmission Plot

after "Stripper": Energy [MeV/u]; window projection --- ²H (6.0 MeV/u) + O (1e-2 μm); Transmitted Fragment ¹H (TwoBody); Optics C
dp/p=100.00%
Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: A



Y-projection

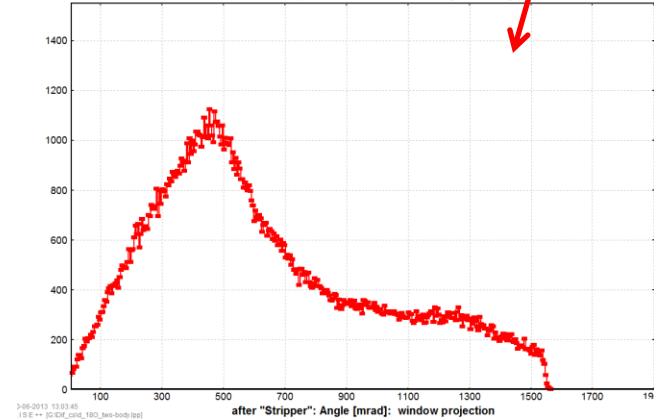
¹H : Monte Carlo Transmission Plot



X-projection

¹H : Monte Carlo Transmission Plot

after "Stripper": Angle [mrad]; window projection --- ²H (6.0 MeV/u) + O (1e-2 μm); Transmitted Fragment ¹H (TwoBody); Optics Or
dp/p=100.00%
Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: A

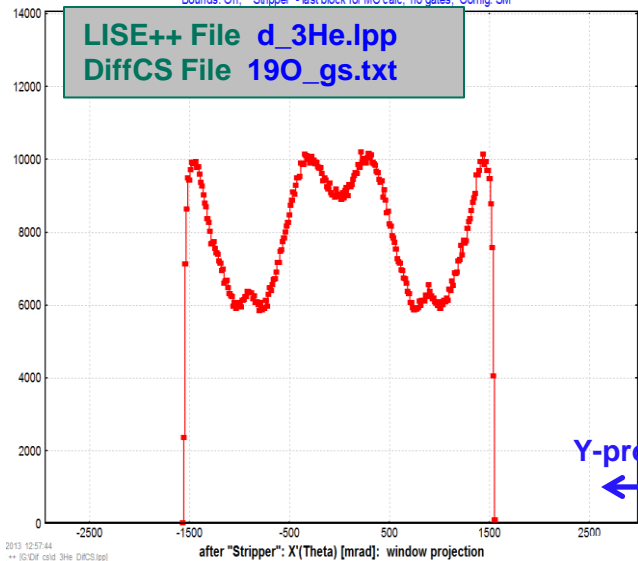


¹H : Monte Carlo Transmission Plot

after "Stripper": X(Theta) [mrad]; window projection -- ³He (1.0 MeV/u) + H2C (1e-3 mg/cm²); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
 dpip=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: SM

LISE++ File d_3He.lpp
 DiffCS File 190_gs.txt

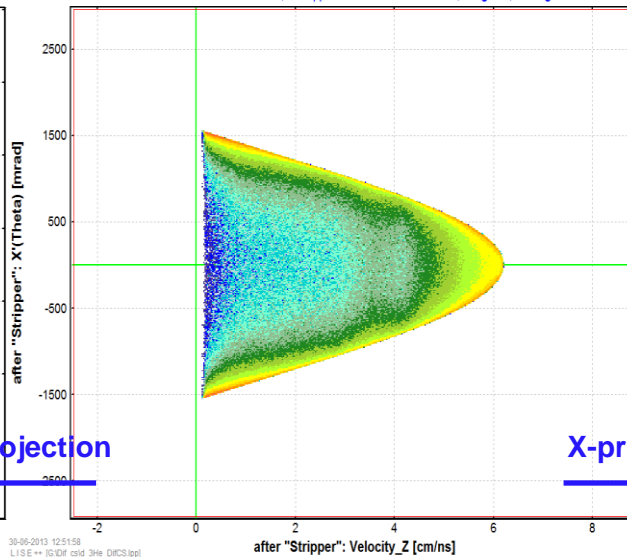


Y-projection ←

¹H : Monte Carlo Transmission Plot

³He (1.0 MeV/u) + H2C (1e-3 mg/cm²); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
 dpip=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: SM

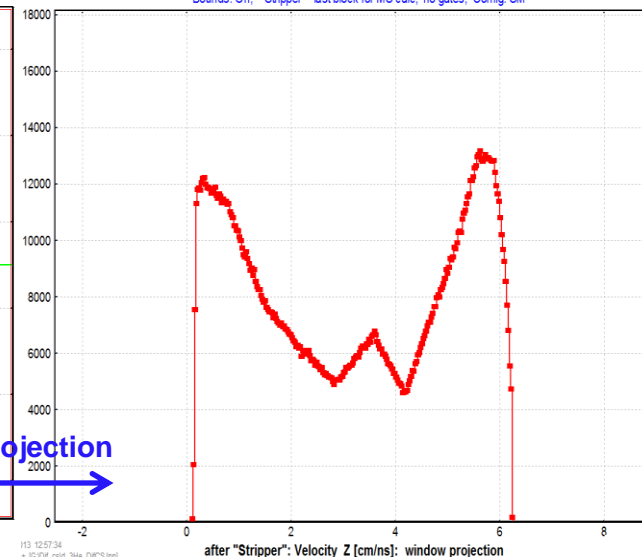


X-projection →

¹H : Monte Carlo Transmission Plot

after "Stripper": Velocity_Z [cm/ns]; window projection -- ³He (1.0 MeV/u) + H2C (1e-3 mg/cm²); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
 dpip=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: SM

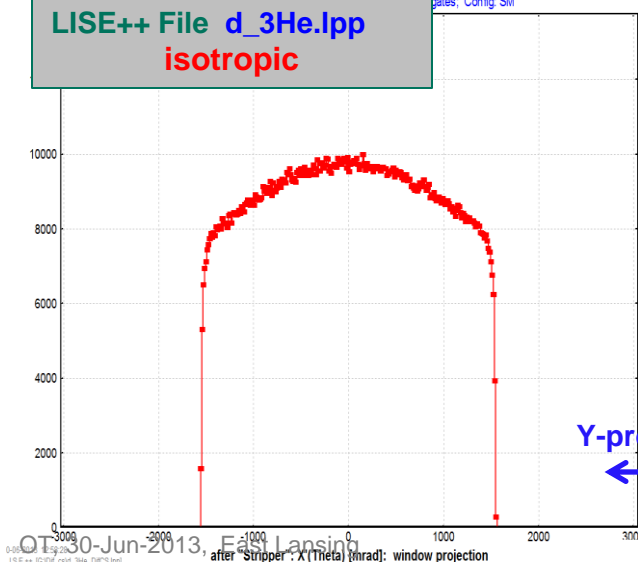


¹H : Monte Carlo Transmission Plot

after "Stripper": X(Theta) [mrad]; window projection -- ³He (1.0 MeV/u) + H2C (1e-3 mg/cm²); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
 dpip=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: SM

LISE++ File d_3He.lpp
 isotropic

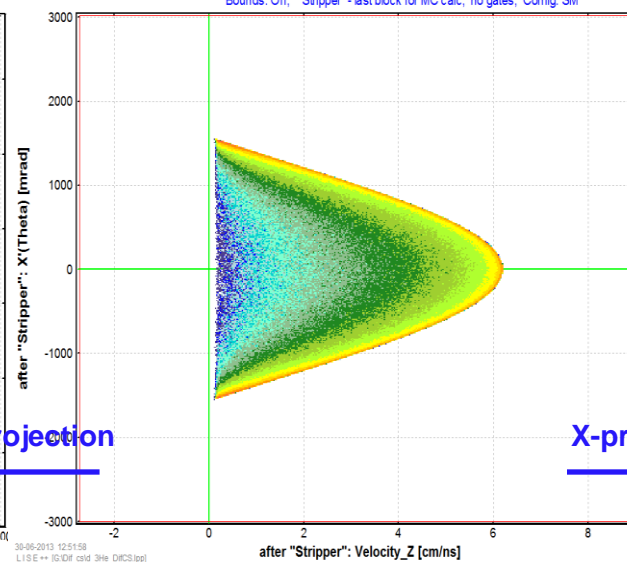


Y-projection ←

¹H : Monte Carlo Transmission Plot

³He (1.0 MeV/u) + H2C (1e-3 mg/cm²); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
 dpip=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: SM

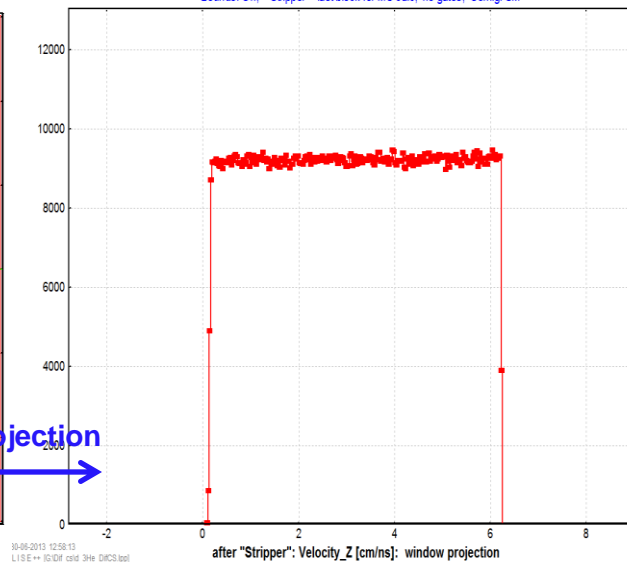


X-projection →

¹H : Monte Carlo Transmission Plot

after "Stripper": Velocity_Z [cm/ns]; window projection -- ³He (1.0 MeV/u) + H2C (1e-3 mg/cm²); Transmitted Fragment ¹H (TwoBody); Optics Order: 1
 dpip=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: SM



- ~~Input UserDiffCS files in LISE++ for future transmission calculations~~
(done version 9.6.54)
- ~~Keep UserDiffCS in LISE++ files (save and restore)~~
(done version 9.6.54)
- ~~Use UserDiffCS in MC transmission calculations for two-body reactions~~
(done version 9.6.54)
- Improve analytical transmission calculations for two-body reactions
- Use UserDiffCS in Analytical transmission calculations for two-body reactions