

# Versions

**15.24.2 – 15.26.1**

**10/30/21**

**v.15.26.01**  
10/30/21

## Last updates:

- **[Angular stragglng contribution to ion optics](http://lise.nsl.msui.edu/15/15_26_1_AngStrag.pdf)**  
[http://lise.nsl.msui.edu/15/15\\_26\\_1\\_AngStrag.pdf](http://lise.nsl.msui.edu/15/15_26_1_AngStrag.pdf)
- Working on bugs (see the updates list)
- Issue with “production material cell color” finally has been solved
- Important update of power deposition and total rates calculations
- New cell colors for quad and fit blocks
- New updates of versions 15.24.2-15.26.1

It is efficient for extended configurations

tuning12	Bp=3.0000 Tm		
z015	standard : 39.6 cm		
Q017TA	QUAD : 10.475 kG		
z018	standard : 17.56 cm		
Q019TB	QUAD : -9.7677 kG		
Fit z19R	s R< 100		
z020	standard : 17.2 cm		
Q021TC	QUAD : 7.057 kG		
z022	standard : 3 Tm		
D1-Y	s Y< 45		
D1	Bp=3.0000 Tm		
D1-X	s X< 100		
z030	standard : 56.4 cm		
Q031TA	MULT : 8.5903 kG		
z032	standard : 13.58 cm		
Q033TB	MULT : -10.584 kG		
config	A1900_extended_LISE	total	
option	A1900_2019	dp/p	
version	15.26.1	5.07%	

** Dipole	tuning12	0	0
drift	z015		0.396
<Quad>	Q017TA		0.748
drift	z018		0.176
<Quad>	Q019TB		0.748
Fit	Fit z19R		0
drift	z020		0.172
<Quad>	Q021TC		0.43
drift	z022		0.526
Fit	D1-Y		0
** Dipole	D1	0	2.43
Fit	D1-X		0
drift	z030		0.564
<Quad>	Q031TA		0.43
drift	z032		0.136
<Quad>	Q033TB		0.812
drift	z034		0.136
<Quad>	Q035TC		0.43
drift	z036		0.586
Fit	I1-focX		0
Fit	I1-focY		0
Fit	I1-AD		0
Fit	I1-XX		0
Fit	I1-T324		0
FaradayCup	FaradayCup 1		
slits	Imae1(037)		0

## Non-connected to Angular straggling contribution update

- 15.24.3 10/05/21 **x - component was fixed** Fixed: Bug with Block cible component modification at rotation block -90 and 90 degrees (Marc)
- 15.24.4 10/05/21 Fixed: Bug with MC Y'-envelope, new parameter opt->MC\_reverseFlag
- 15.25.1 10/05/21 Middle version changed due to serious bug updates
- 15.25.2 10/06/21 Fixed: new bug in Beam dialog with energy cell signals has been corrected
- 15.25.3 10/06/21 Floating plot menu list up to Faraday cup
- 15.25.4 10/06/21 Correction in Floating plot menu list
- 15.25.6 10/11/21 Fixed: bug in the wedge block in the case no blocks after (Mauricio)
- 15.25.7 10/12/21 MC dialog vertical size was decreased
- 15.25.9 10/14/21 **POWER deposition : global revision regarding to fragment charge states**
- 15.25.10 10/16/21 MC rate panel modifications
- 15.25.11 10/16/21 BeamSigma Vector # dialog modification
- 15.25.15 10/22/21 the table of nuclides was updated for 45Si, 71Cr, 72Cr, and 74Mn
- 15.25.16 10/22/21 <QtMultimedia\QSound> --> <QtMultimedia/QSound> (Tong)
- 15.25.27 10/30/21 **solved: wrong colors after file loading with rotation and production materials**
- 15.25.28 10/30/21 new BLOCK function "bool isQuad()"
- 15.25.29 10/30/21 new color (mode) for Quad blocks
- 15.25.30 10/30/21 new color (mode) for Fit blocks
- 15.26.1 10/30/21 with correction in BLOCK\_compound for initialization of AAlocal\_save  
middle version has been changed. Angular Strag Matrices development has been completed

## Connected to Angular straggling contribution update

- 15.25.5 10/09/21 Modification in trans\_angle due to angular straggling contribution.
- 15.25.12 10/16/21 from RecalculateGOM(void) to RecalculateGOM(BLOCK \*blockStarrt=nullptr)
- 15.25.13 10/16/21 **now BlockMatrixFeature is feature of BLOCK\_Compound**
- 15.25.14 10/14/21 trans angle: coming back to g\_aa\*straggling -- neglect 15.24.8
- 15.25.17 10/25/21 new option parameter "AngStragInOptics" --> kept in Options, & LISE files
- 15.25.18 10/25/21 Options dialog modification for new parameter, redesign
- 15.25.19 10/25/21 new functions in BLOCK\_Compound setAngStragInMatrix(double AAx, double Ay), cleanAngStragInMatrix(), setSavedValue\_AngStragInMatrix()
- 15.25.20 10/25/21 modifications for AngStragInOptics in L\_trans, L\_transAngle, o\_Optics (RecalculateGOM)
- 15.25.21 10/26/21 next updates for AngStragInOptics
- 15.25.22 10/27/21 new non-class void clearAngularMatrices
- 15.25.23 10/29/21 new non-class void setAngularMatriceswithPrevious()
- 15.25.24 10/29/21 modifications of the Matrix envelope dialog for Angular Strag Matrices
- 15.25.25 10/29/21 apply Angular Strag Matrices in Matrix envelope
- 15.25.26 10/29/21 apply Angular Strag Matrices in Matrix file
  
- 15.26.1 10/30/21  
with correction in BLOCK\_compound for initialization of AAlocal\_save  
middle version has been changed. Angular Strag Matrices development has been completed

# Versions

**15.23.2 – 15.24.1**

**10/01/21**

v.15.24.01  
10/01/21

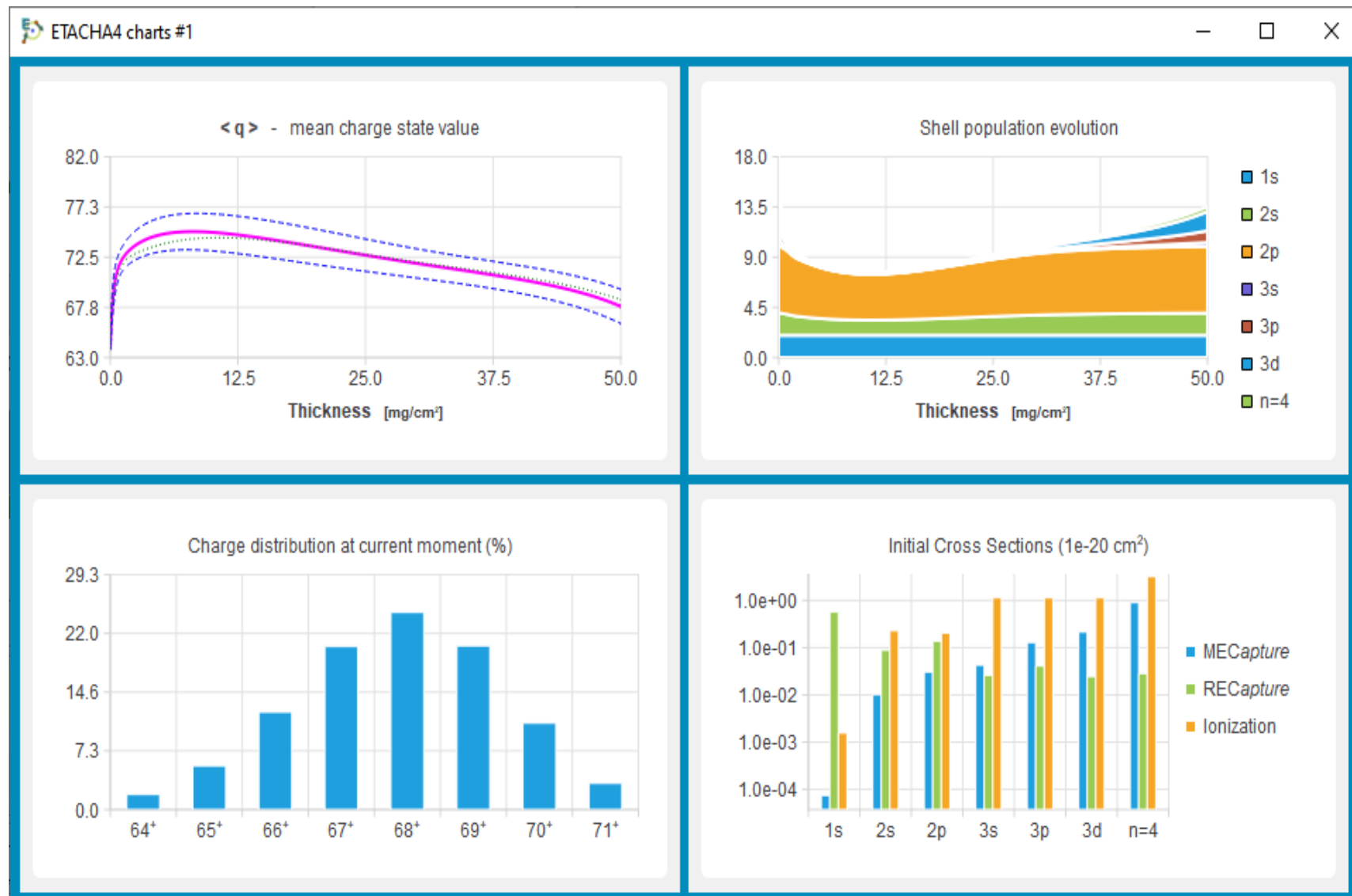
## Last updates:

- **[3-D Monte Carlo transmission: envelopes](http://lise.nslc.msu.edu/15/15_23_envelope3D.pdf)**  
[http://lise.nslc.msu.edu/15/15\\_23\\_envelope3D.pdf](http://lise.nslc.msu.edu/15/15_23_envelope3D.pdf)
- New q vs. A-3q plots, revision of Z, q, A/q, A-nq value resolution
- ETACHA4 revision
- New updates of versions 15.23.02-15.24.1

Two serious bugs have been fixed.  
 We are very grateful to  
 Dr. Toshiyuki Sumikama (RIKEN)  
 for a fast and high-quality analysis.

## Fixed Bugs:

1. Disagreement between  $Q_F$  &  $Q_M$  values.  
*no more needs for a corrective procedure using the dSum value*
2. No cross-section corrections from energy  
*see top-left plot*





15.23.2	09/03/21	<b>FIXED: bug in Physical Calculator for Q-initialization (Mauricio P.)</b>
15.23.3	09/03/21	Physical Calculator -> QString argument is absent : fixed
15.23.4	09/03/21	<b>"BI" code -&gt; format "long" crash : fixed</b>
15.23.5	09/10/21	3D-MC axis -> wrong y-z assignment in MC-trans : fixed
15.23.6	09/10/21	correction of ame2016.lme file
15.23.7	09/11/21	correction and update signals/slots in "reaction" table (Beam & target frame in left setup panel)
15.23.8	09/11/21	"NewVersionForMyDocuments" flag operates now also for minor version change
15.23.9	09/11/21	All LISE package satellites have received Max & Min window flags
15.23.10	09/13/21	<b>New q vs. A-3q plot</b>
15.23.11	09/15/21	revision of Z,q,A-2q,A-3q,A/q resolutions
15.23.12	09/17/21	<b>Creation of MC_trans30_3D distribution for 3D-envelope plot</b>
15.23.13	09/17/21	3D-envelope MC plot
15.23.14	09/17/21	Randomizer for 3D-envelope MC plot
15.23.15	09/17/21	Additional axes for 3D-envelope plot
15.23.16	09/17/21	<b>Fixed: bug with edit validators in IsomerDatabase dialog (Marc H.)</b>
15.23.17	09/17/21	Randomizer option for 3D-MC envelope
15.23.18	09/18/21	Start of 3D-absoluteAxis development
15.23.19	09/20/21	Modifications in 3D-painting
15.23.20	09/21/21	Modifications of Vector3 class to use with QList
15.23.21	09/21/21	MC 3D-envelope inter(3) --> inter(2)
15.23.22	09/22/21	<b>ETACHA revision</b>
15.23.23	09/23/21	3D MC envelope plot -- special initial ratios
15.23.24-30	09/24-30/21	AbsolutePath development , ... , Stop with Absolute path development.
15.24.1	10/01/21	FRIB2021.opt revision, re-saving of examples file to avoid the "calibration" file issue ETACHA update with bug fix Middle version changed

# Versions

**15.19.7 – 15.23.1**

**08/31/21**

v.15.23.01  
08/31/21

- The LISE<sup>++</sup> package porting process has been completed!
- Currently LISE<sup>++</sup><sub>*cute*</sub> is under official benchmark process to be officially accepted to use at NSCL/FRIB with release of stable official version 16.

## Last updates:

- **3-D Monte Carlo transmission**  
[http://lise.nsl.msui.edu/15/15\\_23\\_MC3D.pdf](http://lise.nsl.msui.edu/15/15_23_MC3D.pdf)
- **New LISE<sup>++</sup> feature : LISE file list**  
[http://lise.nsl.msui.edu/15/15\\_20\\_19\\_FileList.pdf](http://lise.nsl.msui.edu/15/15_20_19_FileList.pdf)
- ETACHA4 porting completion
- New updates of versions 15.21.06-15.23.01 : “Trigger” Block
- New updates of versions 15.19.01-15.21.05

ETACHA4 - eUntitled\*

File Execute Help

DOS version About

Projectile

A	Element	Z	Q
207	Pb	82	60

Energy (MeV/u) Stopping power (MeV/mg/cm<sup>2</sup>)

Initial 28.9 75.905

Final 28.532 76.335

Last orbital of

Neutral atom = 6 p 2

Ion in ground state = 3 d 4

Use Energy Loss Calculations

Target

A	Element	Z
12	C	6

5.018e+19 atoms/cm<sup>2</sup>

Thickness = 1 mg/cm<sup>2</sup>

Density = 2.26 g/cm<sup>3</sup>

Version

- v.23 Y(1s,2s,2p),Y(3s),Y(3p),Y(3d)
- v.3 + Y(12,3) *fast, for high E*
- v.34 + Y(4) *do not use*
- v.4 + Y(123, 4) *default*
- v.45 + Y(5) *beta*

Integration model

- ODE ISBN: 0716704617 (ordinary differential equation solver)
- RKF45 (Runge-Kutta-Fehlberg ODE solver)
- Euler's method

Steps & Numerical uncertainties

Absolute = 1.00e-9

Relative = 1.00e-4

Minimum step = 1 μg/cm<sup>2</sup>

Maximum step = 100 μg/cm<sup>2</sup>

IONIZATION model

- CDW-EIS (default)
- PWBA (fast)

EXCITATION model

- Symmetric-Eikonal (default)
- PWBA (fast)

Show Results

Event Logs

- Intermediate output of cross sections
- Debug mode
- Plots

Corrections for PWBA (parameter "ibin")

- 0: empirical saturation correction (default)
- 1: binding correction included (not recommended)
- 2: no empirical correction and no binding correction

Reaction characteristics

perturbation parameter Kp (n=1) = 0.18

perturbation parameter Kp (n=3) = 0.02

projectile velocity V<sub>p</sub> = 33.364 au

Finished at 16:52:35

Elapsed time is 00:00:13 (or 13.408 sec)

Final energy : 28.495 (MeV/u)

output data in files:

00 to 09 EE- charge states in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_Eta0009.txt

10 to 19 EE- charge states in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_Eta1019.txt

20 to 29 EE- charge states in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_Eta2029.txt

30 to 39 EE- charge states in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_Eta3039.txt

40 to 49 EE- charge states in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_Eta4049.txt

50 to 59 EE- charge states in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_Eta5059.txt

bare, 1s, 2s, 2p, 1s2, 1s2s, 1s2p, 1s2 2s, 1s2+2p ions and sum of these in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_ETAPIED.txt

mean 1s, 2s, 2p, 3s, 3p and 3d populations in C:/Users/taras/OneDrive/Documents/LISEcute/results/e/Untitled\_POPMEAN.txt

WARNING! Next calculation will overwrite these files. Consider saving or renaming these results!

FINAL achieved >> T=1.000 mg/cm<sup>2</sup> <Q>=71.771 dQ=1.209 E=28.495 dSum=0.052

Ready

ETACHA cross sections

Capture and Ionization

(sub) shell	MEC (capture)	REC (capture)	ionization
1 1s	7.4753e-5	5.7628e-1	3.4763e-3
2 2s	1.0215e-2	8.8511e-2	3.0829e-1
3 2p	3.0644e-2	1.3817e-1	2.7578e-1
4 3s	4.2868e-2	2.6225e-2	1.6077e+0
5 3p	1.2860e-1	4.0938e-2	1.6077e+0
6 3d	2.1434e-1	2.4563e-2	1.6077e+0
7 n=4	9.0063e-1	2.8335e-2	3.9330e+0

Excitation

From / To	2s	2p	3s	3p	3d	n=4
1 1s	3.7693e-3	6.3286e-3	6.1950e-4	9.2268e-4	7.8450e-5	5.5560e-4
2 2s		6.8601e+0	1.3878e-1	1.3276e-1	4.9516e-1	1.4501e-1
3 2p			1.4652e-2	1.6379e-1	6.1129e-1	1.4708e-1
4 3s				2.5257e+1		4.5247e+0
5 3p					1.1368e+1	5.0498e+0
6 3d						5.9398e+0

Version 4

Ionization: PWBA

Excitation: PWBA

<sup>207</sup>Pb (28.9MeV/u) + C

Accept Continue

Table cells can be edited.

All cross sections in 1e-20 cm<sup>2</sup>

ETACHA4 charts #1

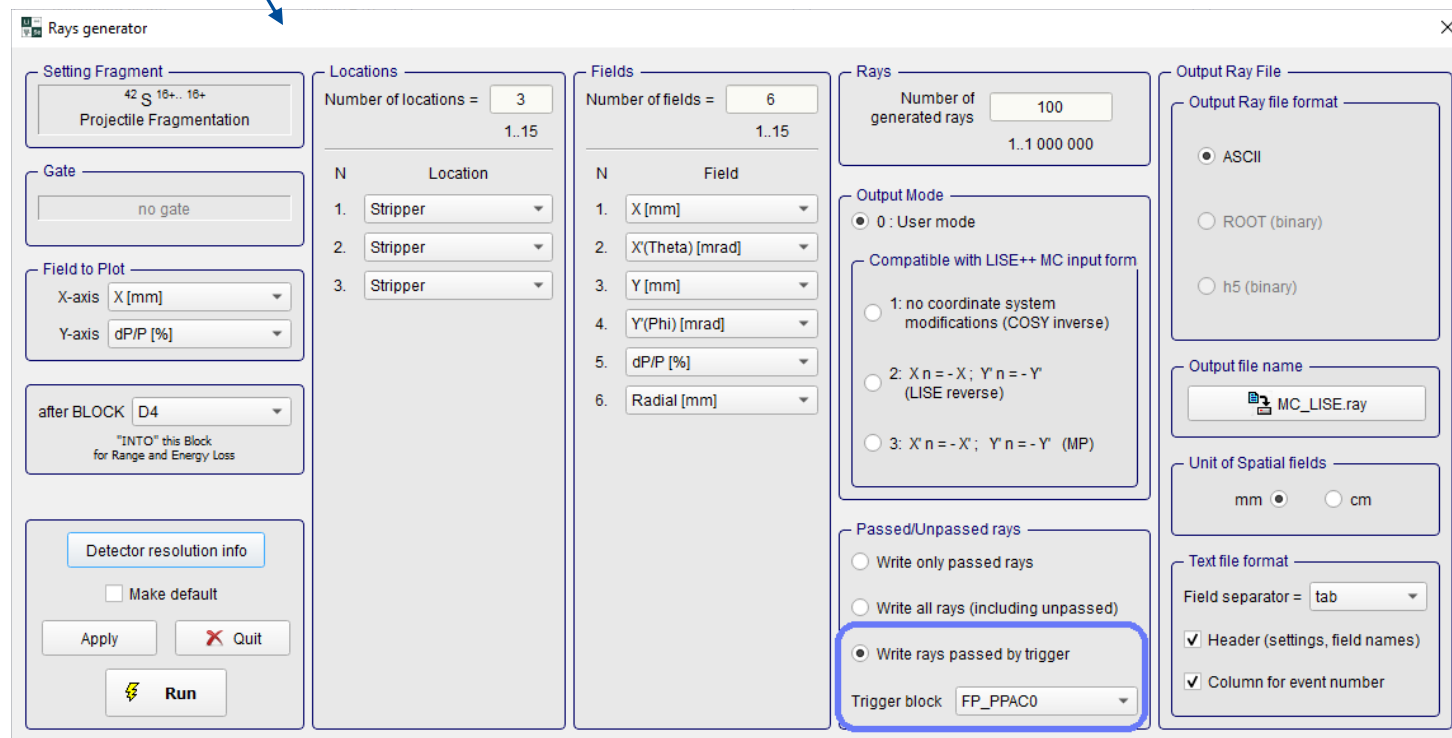
<Q> - mean charge state value

Shell population evolution

Charge distribution at current moment (%)

Initial Cross Sections (1e-20 cm<sup>2</sup>)

- 15.21.6 08/11/21 a1900\_2019.cnf modified
- 15.21.7 08/13/21 trigger block in the rays generator started
- 15.21.8 08/16/21 correction in angular distributions (deuteron-case); **bug** from Borland
- 15.21.9 08/16/21 trigger block in the rays generator completed
- 15.21.10 08/16/21 vertical positions modification for MC text in right windows
- 15.21.11 08/16/21 function "OutTextOleg" has been modified for space
- 15.21.12 08/16/21 correction for the Trigger block : LastBlockMC\_Into is used instead previous LastBlockMC\_Transmission  
RaysGenerator dialog modification for the "Number of rays" string
- 15.21.13 08/17/21 Modification of main.cpp for initial LISE paths
- 15.21.14 08/16/21 correction in angular distributions (deuteron-case); MonteCarlo and Secondary targets
- 15.22.1 08/17/21 middle version changed
- 15.22.2-9 08/21/21 3D MC construction
- 15.23.1 08/31/21 ARIS files update. New middle version



## v.15.21.05 08/10/21

15.19.8	05/21/21	corrections in HighDpiScaling attribute at start
15.19.9	05/25/21	FIXED: bug in the RangeOptimizer isotopes plot: zero transmission
15.20.1	06/08/21	Bug corrected: Save text file in html or text format (MH's request)
15.20.2	06/11/21	LISE was moved to Qt6
15.20.3	06/11/21	QRegularExpression uncommented in D_DataBase_isomer
15.20.4	06/17/21	LISE was moved to Qt6.2
15.20.5	06/17/21	LISE came back to 15.2 mappedInt(int) --> mapped(int)
15.20.6	06/18/21	correction in lise.xlsm call. New function void CmCodeLink(QUrl &url)
15.20.7	06/18/21	MC option dialog modifications for charge state optin in IsoList mode
15.20.8	06/18/21	MC option dialog modifications for RB file modes
15.20.9	06/19/21	MC option dialog modifications. RB file modes disabled
15.20.10	06/20/21	no more average char width. using boundingRect instead Qt6.2 -- aveCharWidth -- wrong!!!
15.20.11	06/20/21	Plots: correction for vertical axis labels
15.20.12	06/20/21	plot25 -- correction of plotting labels for 4K-monitors and Qt62
15.20.13	06/25/21	LISE package was recompiled including ETACHA
15.20.14	06/26/21	List of LISE files to load : start
15.20.15	07/06/21	Charge states codes icons were modified
15.20.16	07/06/21	Bugs were fixed at loading. Invalid parameter + now LISE configuration
15.20.17	07/06/21	List of LISE files to load: dialogs done
15.20.18	07/07/21	Completed: List of LISE files to load
15.20.19	07/07/21	List of LISE files: can be used as argument
15.20.20	07/11/21	Fixed: bug in numberKillZero if no decimal point and last digit is 0
15.20.21	08/02/21	ETACHA has been ported to Qt. ETACHA can be called from LISE
15.20.22	08/02/21	ODE directory modification for LISEcute and ETACHA projects
15.20.23	08/02/21	Corrections with Show Isomer option in ini-file
15.20.24	08/02/21	w_showCalc --> two toolbars
15.21.1	08/02/21	middle version has been changed for final benchmarks
15.21.2	08/06/21	* No debug lines in main.cpp, * corrections for wide monitors in the case of Graphs, * Graph location on the middle of mainWindow, * Calibration file reading : uses "r" instead "rt". Should be checked with linux
15.21.3	08/08/21	ETACHA plots were done
15.21.4	08/09/21	Calibration and COSY file names are converted to Universal names after LISE file reading
15.21.5	08/10/21	w_Stuff/liseStrcpyOS.h ==> strcpy_s -> strlcpy
15.21.6	08/11/21	a1900_1900.cnf modified

# Versions

**15.14.15 – 15.19.7**

**05/11/21**

**v.15.19.07**  
05/11/21

- 15.17.2 04/15/21 minimize buttons for PhysCalc and d\_Datafit\_minimization dialog
- 15.17.3 04/15/21 Prevent unplotting blocks after Faraday cup (HW's request)
- 15.17.4 04/15/21 Brho plot has been added to Beam charge state plot request
- 15.17.5 04/16/21 New class "ResidDeposition" to assist with power deposition and rate analysis by blocks
- 15.17.6 04/16/21 Block Power Residual analysis implemented in the "Power deposition by blocks" dialog
- 15.17.7 04/16/21 Block total residual and lost rate analysis implemented in the "Power deposition by blocks" dialog (Mauricio's request)
- 15.17.8 04/16/21 Package code names were modified to run in Unix and Mac
- 15.17.9 04/17/21 correction in w\_Graph\_Scanning plots (crash due to char\*\* legend size)
- 15.17.10 04/18/21 Implementation of CS err factor for AA minimization
- 15.17.11 04/18/21 button "Clear AA calculations" in AA minimization dialog
- 15.17.12 04/18/21 using Reduced Chi-square in minimization
- 15.17.13 04/18/21 ETACHA has been excluded temporary from LISE\_package
  
- 15.18.1 04/19/21 using Reduced Chi-square in minimization
- 15.18.2 04/19/21 "product"-value in Chi-square table has ben modified
- 15.18.3 04/20/21 2D-plot "product"-values Z vs N
- 15.18.4 04/20/21 2D-plot "LogDif"-values Z vs N
- 15.18.5 04/24/21 modification in d\_Apf\_ExcEnergy validators
- 15.18.6 04/24/21 corrections in Brho Tweaks
- 15.18.7 04/24/21 AA-minimization : Ok & cancel butons are disabled during minimization
- 15.18.8 04/25/21 Modifications in main.cpp withQtApp and arg[1]
- 15.18.9 04/26/21 LISErootPATH = QApplication::applicationDirPath();
  
- 15.19.1 04/29/21 PACE4, Global, Charge, GEMINI codes were corrected for initial directories and downloading associated files at start
- 15.19.2 05/06/21 Info message if table.iso file was not found
- 15.19.3 05/06/21 lise.ini file is not copied more to Documents folder
- 15.19.4 05/06/21 table2016.iso and table2021.iso now both in the "copy" package
- 15.19.5 05/11/21 Spelling correction in the DataFit dialogs
- 15.19.6 05/11/21 d\_CN1\_dialogs (as PhysCalculator) -- correction for q=0 case (HW's request)
- 15.19.7 05/11/21 d\_Apf\_excitation -- correction for make\_static() at start

- 15.14.15 04/06/21 corrections in beam energy deposition for beam absorber (as thick wedge) in middle of spectrometer
- 15.14.16 04/06/21 corrections in beam energy deposition for fragment energy after target
- 15.15.1 04/06/21 middle version has been changed to outline modified version
- 15.15.2 04/07/21 splitting win\_utilCalc to win\_utilCalc and win\_utilStatistics cause of Qt6 & Global code
- 15.15.3 04/08/21 no w\_converter.pro more. Creating LISE\_package.pro
- 15.15.4 04/08/21 renaming L\_Calise\ch\_charge\ch\_\*. \* to L\_Calise\ch\_charge\charge\_\*. \* to avoid conflicts during LISE\_package compilation
- 15.15.5 04/09/21 implementation QLocale decimal point and using it in numberKillZero and kill\_zero
- 15.15.6 04/09/21 user DoubleSpinBox validator has been changed for comma
- 15.15.7 04/09/21 LISE uses always QLocale::C (simplified English)
- 15.15.8 04/10/21 LISE\_Package structure update to avoid doubling with names
- 15.15.9 04/10/21 Kantele calculator porting FINISHED
  
- 15.16.1 04/10/21 middle version increased with LISE\_Package project implementation and Kantele finishing
- 15.16.2 04/11/21 plugins windowsprintsupport.dll in package
- 15.16.3 04/11/21 w\_ListWin : printview button, modification to ScreenResolution
- 15.16.4 04/12/21 w\_ListWin : Font family and font size
- 15.16.5 04/12/21 w\_ShowCalc : no Font family action
- 15.16.6 04/12/21 Plots printing : DONE
- 15.16.7 04/13/21 Global-LISE interface bug (from Borland) : no checkpoint for negative charge state values
- 15.16.8 04/13/21 Correction for TransPlots in the case of non-equilibrium in transmission Init=false mode.
- 15.16.9 04/13/21 modification of w\_Show\_Block to prevent non-correct background color change
- 15.16.10 04/13/21 Creation of monospace font list in w\_ListWin to use TrueType fonts starting from "Consolas", "Lucida Console", "Monaco", "Courier New", "Courier"
- 15.16.11 04/13/21 static FontName value to use in the next window
- 15.16.12 04/13/21 Implementation of weight analysis based on CS errors in AA minimization
- 15.16.13 04/13/21 Chibox class revision
- 15.16.14 04/14/21 Modifications of d\_Data\_fitMinimization and d\_Data\_fitMatrix for CS errors weight analysis and Chi-box class revision
- 15.16.15 04/14/21 d\_Setup dialog : keyPressEvent analysis
- 15.16.16 04/15/21 AME2020 mass table as LME-file has been implemented in the code

# Versions

**15.13.3 – 15.14.14**

**04/03/21**

**v.15.14.14**  
04/03/21

- List of modifications of v.15.14.2-15.14.14 04/03/21
- New utility “Beam energy scanning”
- List of modifications of v.15.13.3-15.14.1 03/20/21
- [Energy deposition in blocks \(use link\)](#) 04/03/21

# New utility "Beam energy scanning"

v.15.14.5  
03/25/21

Calculations Utilities 1D-Plot 2D-Plot Database

- Goodies
  - Calibration tools
  - Transmission and rate
  - Optimization**
    - Optimum Target
    - Optimum Target-Wedge and Wedge-Wedge configurations
    - Optimum Charge State combination
    - Beam energy scanning (fixed brho's, target & wedges)**
    - Brho scanning (fixed beam, target & wedges)
- Monte Carlo calculation of transmission
- Calculators

Beam energy scanning ==> set beam parameters: nuclide, energy region

A	Element	Z	Table of Nuclides	
54	Fe	26	← Z →	
	Stable		← N →	

Energy scanning region

Energy<sub>MIN</sub> = 98 MeV/u  
Energy<sub>MAX</sub> = 168 MeV/u

Choose the rectangle to calculate background

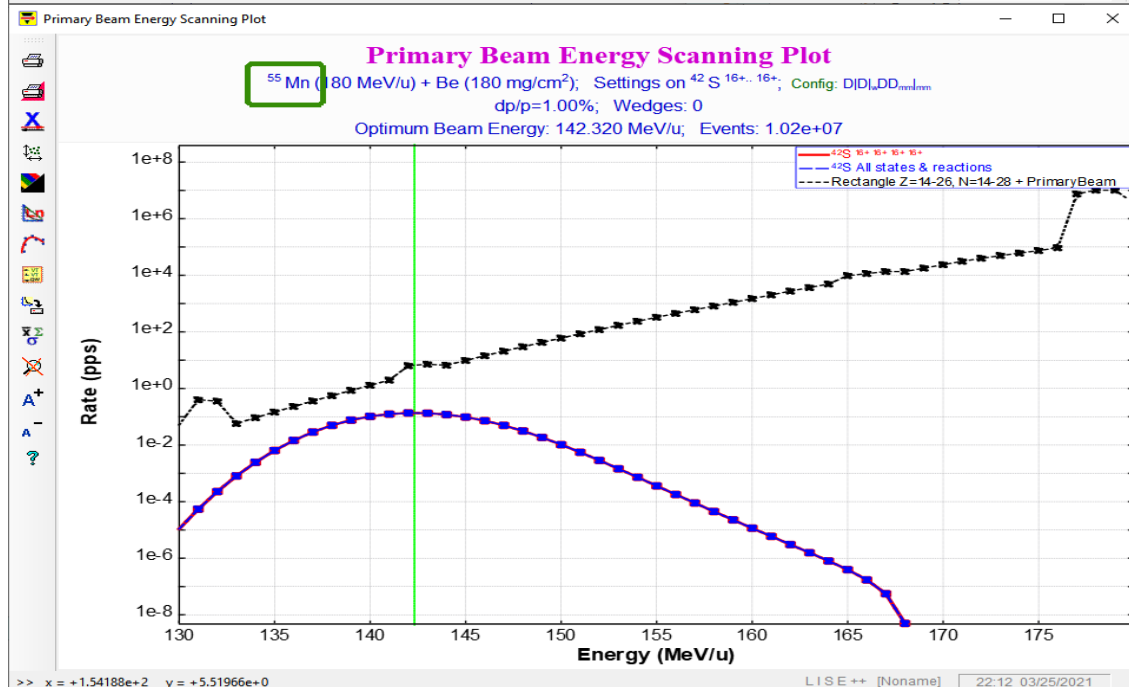
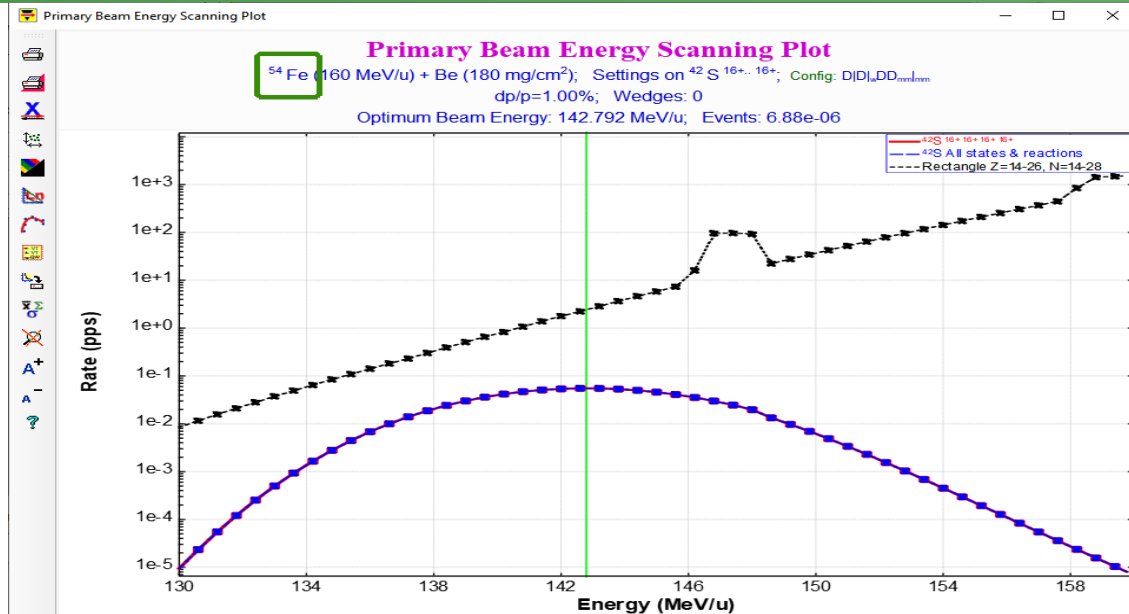
		Z	N
1 <sup>st</sup> corner →	28Si	min 14	14
2 <sup>nd</sup> corner →	54Fe	max 26	28

Calculate a background rate

Number of points

Calculate the primary beam transmission if the primary beam is out of the rectangle

Scan  Cancel



```
//-----
15.14.1    03/20/21
Middle Version increased for a new version for local release
//-----
15.14.2    03/24/21
Modification of LoD parameter x -> 10^x-1
//-----
15.14.3    03/24/21
Revision of chi2-box
//-----
15.14.4    03/24/21
Modification of AA-compare
//-----
15.14.5    03/25/21
Beam energy optimization utility
//-----
15.14.6    03/26/21
Excitation Energy polynomial update for negative case
//-----
15.14.7    03/29/21
Using db_StabilityC value instead Min(S1n,s2n) in dBESn
//-----
15.14.8    03/30/21
Modification of GlobalBreak flag in o_AA_manage and W_Graph_Qgg
```

```
//-----
15.14.9    04/01/21
correction in Stripper dialog for energy loss and dR
//-----
15.14.10   04/01/21
Energy deposition in blocks
//-----
15.14.11   04/01/21
Working on Energy deposition in blocks
//-----
15.14.12   04/02/21
Energy deposition in blocks : using reactions factor
modifications in w_ShowCalc for specialCase to avoid additional deposition
//-----
15.14.13   04/03/21
modifications in charge state optimization procedure
to keep beam deposition
//-----
15.14.14   04/03/21
corrections for reaction factor in beam energy deposition
```

```
//-----
15.13.3    03/06/21
Corrections in Material range selection dialog (Helmut's request)
//-----
15.13.4    03/06/21
Optical matrix mask has been changed to accept manual rotation
//-----
15.13.5    03/06/21
Rotation block new option : manual editing angle
//-----
15.13.6    03/06/21
No assert inserts in dedx_n/calculations.cpp/atima1.4 using solid
constraints
//-----
15.13.7    03/06/21
Link on 238U GANIL paper in fusion dialogs
//-----
15.13.8    03/13/21
BI-code revision
//-----
15.13.12   03/16/21
BI-code is running (2D - NSCL)
plot -IN, search, plot - OUT, Plot BI dialogs and utilities
BI-code is running (1D - NSCL)
//-----
15.13.13   03/17/21
BI-code works with real coordinates
//-----
15.13.14   03/17/21
BI-code works ROOT-files
```

```
//-----
15.13.15   03/17/21
new "decay_mode2021.isolist", correction in rgd35 -> BC-Qt color converter
correction in "FRIB_decay.isolist" file
correction in d_Isotope for ComboColor initialization
//-----
15.13.16   03/17/21
new utility "generate Global property table" in d_Isotope dialog
//-----
15.13.17   03/18/21
revision of BI-utility (no binary R/W options, no handles), optimization
option "PlotMC save to file" works
option "Save Kinematics to file" works
//-----
15.13.18   03/18/21
Kantele handbook update
//-----
15.13.19   03/19/21
BI_utility : final optimization, temporary no ASCII_TXT option
//-----
15.13.20   03/19/21
d_Data_Fit_minimization : option to generate the chi2 table
//-----
15.13.21   03/19/21
update of PACE4, Gemini, Kantele utilities
//-----
15.13.22   03/19/21
d_Data_Fit_minimization : information string
d_Data_Fit_minimization : Fit Gauge position
//-----
15.13.23   03/20/21
d_Database: correction in User ME case
//-----
15.13.24   03/20/21
BI_utility : correction for ROOT format reading header
```

# Versions

**15.12.2 – 15.13.2**

**03/05/21**

**v.15.13.2**  
03/05/21

- List of modifications of v.15.12.2-15.13.2 03/05/21
- Utilities update 03/05/21  
[http://lise.nsl.msu.edu/15/15\\_13\\_2\\_utilities.pdf](http://lise.nsl.msu.edu/15/15_13_2_utilities.pdf)



- List of modifications of v.15.10.2-15.12.1 02/23/21
- List of modifications of v.15.8.2-15.10.1 02/09/21
- 2-angle wedge (user wedge shape)
- List of modifications of v.15.2.3-15.8.1 02/03/21
- List of modifications of v.15.1.9-15.2.2;  
Revision of the Global code (Qt-version) 01/16/21
- List of modifications of v.15.1.7-15.1.8;  
Revision of the Charge code (Qt-version)
- Corrections in the Differential CS procedures
- Using material thickness in spectrometer length (MC mode),  
new parameters Zbegin and Zend in MC ray files
- List of modifications of v.15.1.3-15.1.6 01/09/21

```
//-----
15.12.2    02/26/21
Correction in reading PACE4 and GEMINI plots
no ETACHA4 icon in the toolbar
//-----
15.12.4    02/26/21
Correction in MainWindow_fit Plots (matrix)
//-----
15.12.5    02/26/21
Correction in w_Graph_optimumWedge (matrix)
Correction in w_Graph_optimumWedge (output file)
//-----
15.12.6    02/26/21
Modification of DataFit ouptut file
//-----
15.12.7    02/26/21
Modification of DataFit dialog : mass information
//-----
15.12.8    02/27/21
PACE4 has been adapted to the LISEcute package
//-----
15.12.9    02/28/21
Modification in DataFitMatrix : dialog and plot
//-----
```

```
//-----
15.12.9    02/28/21
Modification in DataFitMatrix : dialog and plot
//-----
15.12.10   02/28/21
Modification in DataFitMinimization : dialog
//-----
15.12.11   03/02/21
Correction in CmCosyLinksUpdate() (Marc's request)
//-----
15.12.12   03/03/21
COSY dialog file extension
//-----
15.12.13   03/03/21
Toolbar and menu reorganization. New action Beam energy optimization
//-----
15.13.1    03/05/21
Utilities were updated: Gemini, PACE, Global, Charge, Kantele.
Kantele 70%, Etacha 5%, all other 100%
//-----
15.13.2    03/05/21
All Utilities were updated LISEpp.ini fonts
```

**Versions**

**from**

**15.02.1 01/08/21**

**to**

**15.12.1 02/23/21**

15.11.2 02/22/21

**New calc parameter : transmission information without secondary reactions**

//-----

15.11.3 02/23/21

Kantele Handbook has been implemented in the package (still under construction)

//-----

15.11.4 02/23/21

Corrections in d\_Input\_material titles (Range,Charge Distribution,MeanCharge)

Transmission statistics: 41Al

Save As Print Transmission analysis LISE database Decay analysis Bra r

**41Al Beta-decay (Z=13, N=28) Aluminum**

Q1 (D1)	13
Q2 (D2)	13
Q3 (D3)	13
Q4 (D4)	13
Reaction	ProjFrag

Ion Production Rate (pps)	3.15e-3
Total Ion transmission (%)	1.76e+2
TI transmission no SR (%)	27.583
Total: All reactions (pps)	3.15e-3
X-Section in target (mb)	2.15e-9

Target (%)	5.19e+2
Unreacted in material (%)	81.48
Unstopped in material (%)	100
Secondary Reactions (coef)	6.37

Transmission WITH secondary reaction factor

Transmission WITHOUT secondary reaction factor

secondary reaction factor

- 00 Ion Production Rate (pps)
- 01 Total: this reaction (pps)
- 02 Global ISOTOPE transmission for all reactions [%]
- 03 Total: All reactions (pps)
- 04 X-Section in target (mb)
- 05 X-Section in stripper (mb)
- 06 Total ION transmission for selected reaction [%]
- 07 TI transmission no SR (%)**
- 08 Energy After Target (MeV/u)
- 09 Energy deviation (MeV/u)
- 10 Target - Block transmission (%)
- 11 Target - X space transmission (%)
- 12 Target - Y space transmission (%)
- 13 Target - X angular transmission (%)
- 14 Target - Y angular transmission (%)
- 15 Target - Unreacted in material (%)
- 16 Target - Q (Charge) ratio (%)
- 17 Target - Unstopped in material (%)
- 18 Target - Secondary Reactions (coef)
- 19 Stripper - Block transmission (%)

LISE file is compatible with previous versions.  
 New calc. parameter is recalculated on the base of other saved calculated values

- //-----
- 15.10.13 02/19/21  
Modification of d\_PhysCalculator : editing materials in the bottom table
- //-----
- 15.10.14 02/20/21  
Ksenia's updates with Dialogs, layouts, fonts, benchmarks (for 1 week)
- //-----
- 15.10.15 02/20/21  
Modification in d\_ElectricDipole for enable/disable AdvadnsedGroupBox
- //-----
- 15.10.16 02/20/21  
Radiobutton Groupboxes in d\_Acceptance/Slits dialog
- //-----
- 15.10.17 02/21/21  
Update of d\_Data\_fitMinimization dialog for dR correction parameter

Physical Calculator dialog box showing various parameters for material analysis. The 'After / Into material' section is highlighted with a red box. The 'Range and Energy Loss in' section is also highlighted with a red box. The 'Calculation method of' section is highlighted with a red box. The 'After' section contains a table of material blocks.

Block	Z	Thickness	Remain MeV/u	Remain MeV	E-Loss MeV	<q>
FP_PIN	Si	504 micron	541.296	2.27e+04	65.627	16
FP_Stack0	Si	500 micron	539.744	2.27e+04	65.171	16
FP_Stack1	Si	1000 micron	536.634	2.25e+04	130.497	16
FP_Stack2	Si	1000 micron	533.518	2.24e+04	130.813	16
FP_Stack3	Si	1000 micron	530.394	2.23e+04	131.129	16
FP_Stack4	Si	1000 micron	527.262	2.21e+04	131.445	16
FP_SCI	C9H10	100 mm	344.079	1.44e+04	7688.616	16

User Cross-Section analysis using the Abrasion-Ablation model : MINIMIZATION dialog box. The 'dR correction' section is highlighted with a red box. The 'Fitting' section is highlighted with a red box. The 'Operations' section is highlighted with a red box. The 'Analysis Log-file' section is highlighted with a red box.

**dR correction**

Effective Coulomb barrier: 5

**Fitting**

N iterations = 200

Fit options

Show initial conditions

Target value = 6.78e+00

N CS points = 11(54)

Restore previous values

**Operations**

Save Settings

Load Settings

Evaporation Settings

Prefragment excitation energy

**Analysis Log-file**

Browse

View

78Kr\_hfb22\_dr5\_2

15.10.2 02/10/21

New **correction** in Tweaks

15.10.3 02/10/21

left-set panel -> verticalScrollBar : after refreshing the scrollbar coming back on the previous position

15.10.4 02/12/21

**Corrections** in TListWinfile: modified for only Read, problems with viewing CS file

15.10.5 02/12/21

**Corrections** in d\_Fit dialog: modified for Block name edit

15.10.6 02/13/21

**Corrections** in d\_MC dialog: modified for absent blocks (new configuration) **crushed**

15.10.7 02/13/21

Ksenia's updates with Dialogs, 2/08-12,

15.10.8 02/13/21

All decays dialogs (p,a,SF,cluster) were modified

15.10.9 02/15/21

Modification in AA-minimization output file

15.10.10 02/15/21

**Correction** in d\_RangeOptimizer

15.10.11 02/19/21

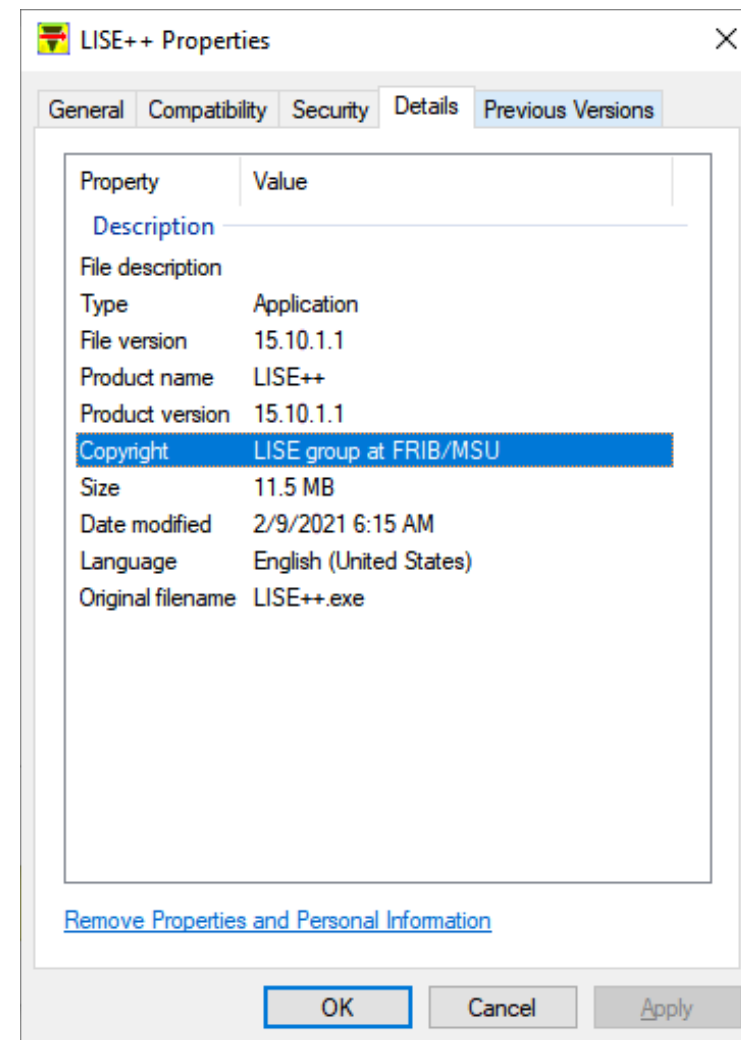
**Correction** in reading User Thickness file (d\_Profile\_custom) for dimension of TempCP distribution

15.10.12 02/19/21

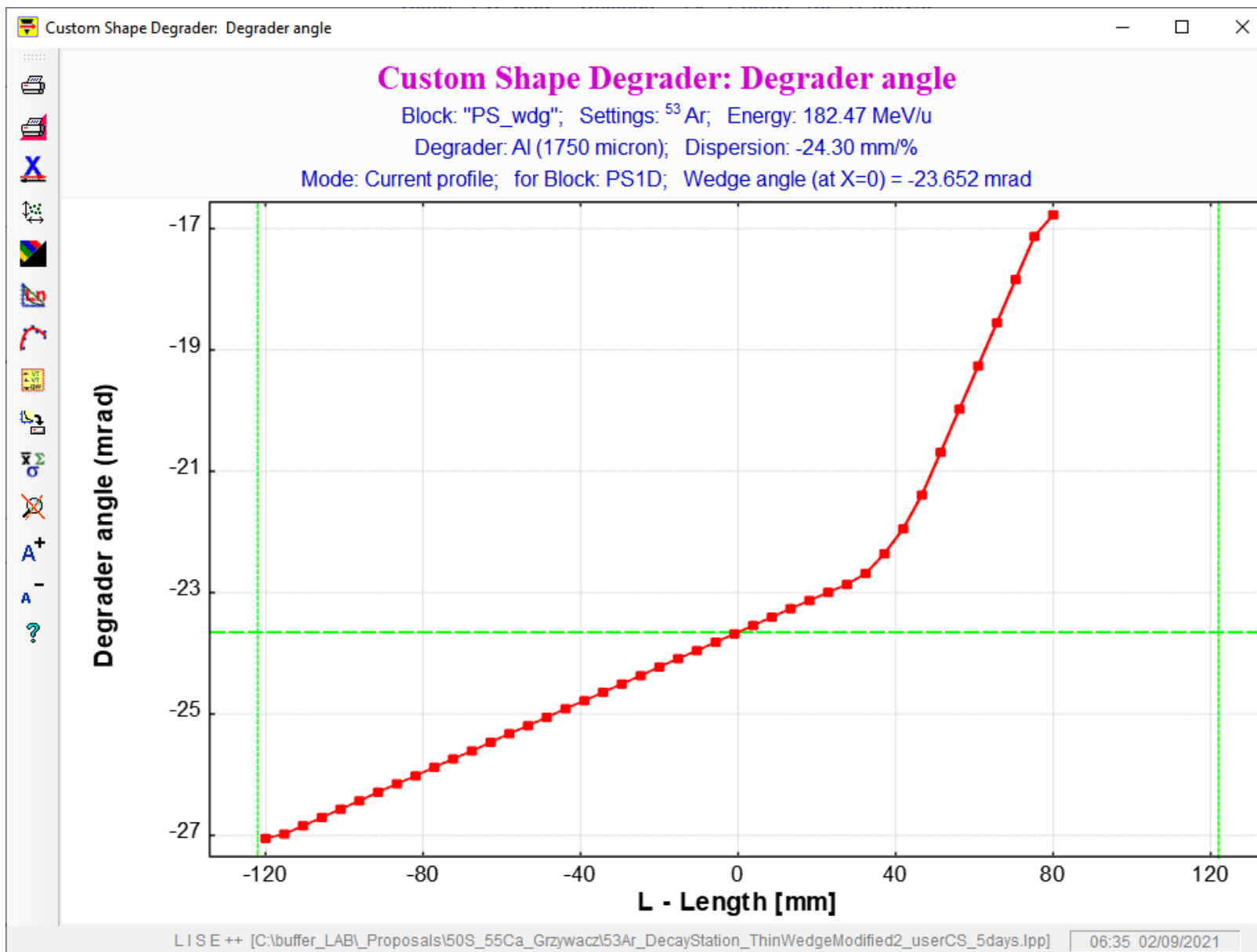
New button "FIT step" in d\_Profile\_custom dialog

Use this step after reading a user Thick(X) file.  
 Recommendation: use 64 points and 4<sup>th</sup> order polynomial.

```
//-----
15.8.2  02/05/21
Custom profile degrader:
* Complex operation button
* Load user T=f(X) file button
//-----
15.9.1  02/04/21
Middle Version increased for a new version for local release
//-----
15.9.2  02/05/21
typos "Compound-Fission" -> "Compound-Residue" in W_Graph_CS
//-----
15.9.3  02/06/21
Version and Product information in project file
//-----
15.9.4  02/07/21
Correction in Polynom shape calculations in d_Profile_custom
//-----
15.9.5  02/08/21
modification of make_static for enable properties of polynom cells in d_Profile_custom
//-----
15.9.6  02/08/21
Ksenia's updates with Dialogs, benchmarks (for 3 days)
//-----
15.9.7  02/08/21
Correction for The Table button in d_CN_CS dialog for calling from another dialog.
//-----
15.9.8  02/08/21
Correction for The Load Table button in d_Matrix calculator
//-----
15.9.9  02/08/21
Correction in opening debug "distrib.txt" file procedure
//-----
15.9.10 02/09/21
Correction in d_Setup dialog to refresh total length and number of blocks
```



LINK: [http://lise.nslc.msu.edu/15/15\\_9\\_1\\_UserWedge.pdf](http://lise.nslc.msu.edu/15/15_9_1_UserWedge.pdf)



//-----

15.7.2 01/29/21

**correction in Tweak valid procedure in Optical Block dialog**

//-----

15.7.3 01/30/21

Table of nuclides has been updated for new isotopes observation  
RIKEN -9 AF , GSI - 1 SHE, Berkley 244Md, SHANS 222Np,  
RITU 211Pa, GSI - 235Cm, SHANS - 220Np,  
table2016 updated to table2021.iso.

//-----

15.7.4 01/30/21

More distribution dimension option in Fission fragment de-excitation process: 32

//-----

15.7.5 01/31/21

**Correction in main.cpp for HighDPIsettings in the case of MyDocuments INI case**

//-----

15.7.6 01/31/21

**Correction in d\_Multipole and d\_MultipoleEffLength**

//-----

15.7.7 01/31/21

**Correction in d\_Fission\_properties**

//-----

15.7.8 01/31/21

**Correction in COSYfile procedures (set wrong COSY link in Optical blocks)**

//-----

15.7.9 02/01/21

More distribution dimension option in Fission fragment de-excitation process: 24

//-----

15.7.10 02/01/21

**Fixed: bug in Dipole-based dialogs with make\_static**

//-----

15.7.11 02/01/21

New option "Use Zoom In/Out in the Table of nuclides" (Font size dialog in the Preference dialog)

//-----

15.7.12 02/02/21

Output file modification in the IFN utility

//-----

15.7.13 02/02/21

new parameters in fission de-excitation process (suppression factors, E-sigma)

//-----

15.7.14 02/03/21

Ksenia's updates with Dialogs, benchmarks (for 3 days)

//-----

15.7.15 02/03/21

**Corrections in the Plot\_options dialog (energetic resolution)**

//-----

15.7.16 02/03/21

**Corrections in make\_static in d\_Buncher**

//-----

15.8.1 02/03/21

Middle Version increased for a new version for local release

```
//-----  
15.6.2 01/28/21  
* Matrix cell font size was modified  
* Issue with Tweaks in optical dialogs was solved / Marc's request  
1. 0 is allowed value  
2. Bug was fixed PermitFlag in ValidTweak() subroutine  
  
//-----  
15.6.3 01/28/21  
* Left setup panel block: block information (Brho, Thickness) Labels  
* SecReact and AA labels  
--> are Clickable now  
  
//-----  
15.6.4 01/28/21  
Cursor shape is changed in Clickable Label area  
  
15.6.5 01/28/21  
Ksenia's updates with Dialogs  
Corrections in d_CS_filesPlot for plotting comments  
  
15.6.6 01/29/21  
Fixed: bug in p_Block_CalcForBlock subroutine  
Fixed: bug RF_kicker optimization plots  
  
15.6.7 01/29/21  
Global revision of RF_separator optimization process  
  
//-----  
15.7.1 01/29/21  
Middle Version increased for a new version for local release
```

```
//-----
15.5.3  01/25/21
Ksenia's updates with Dialog layouts
MC dialog layout remade for lower vertical size
//-----
15.5.4  01/25/21
new option Enable/Disable HighDpiScaling in FontSize dialog in Preference dialog
Question to reboot if font size was changed
//-----
15.5.5  01/25/21
modification of main.cpp file for the option Enable/Disable HighDpiScaling
//-----
15.5.6  01/25/21
modification of MainInitDir file for Copy files to Document Directory. OverWrite=false
Copy files starts from Middle version changes. Before (15.1-15.5.1) for all versions
//-----
15.5.7  01/25/21
Fixed : bug with opening LME database (alpha, beta, branch)
//-----
15.5.8  01/25/21
d_CN dialogs modified to use beta and alpha symbols
//-----
15.5.9  01/25/21
Ksenia's updates with Dialog layouts
//-----
15.5.10 01/25/21
d_CN*_base dialog layouts revised
//-----
15.5.11 01/26/21
corrections in "Position-Thickness frame" in Wedge dialog / Marc's request
//-----
15.5.12 01/26/21
new: EPAX label in Reaction message in left-setup panel
//-----
15.5.13 01/26/21
matrix cell font decreased by two points
```

```
//-----
15.5.14 01/26/21
Ksenia's updates with Dialog layouts
//-----
15.5.15 01/26/21
using flexible font size and stretching for block name buttons
//-----
15.5.16 01/27/21
CmRefresh signal splitted on CmClearRefresh and CmRefresh to avoid cleaning
statistics in some cases
//-----
15.5.17 01/27/21
CmRefresh signals were verified
//-----
15.5.18 01/27/21
All Thickness and Profiles dialog layouts modified
Profiles dialog style was modified
//-----
15.5.19 01/27/21
Ksenia's updates with Dialogs
//-----
15.5.20 01/27/21
Fixed: Crash in Show details and CS in Fusion dialog / Ksenia request
//-----
15.5.21 01/28/21
Fixed: Optimizer WORKS! / Kenny's request
Qt&C&C++ issue with swtich block in include file
//-----
15.6.1  01/28/21
Middle Version increased
```

```
//-----  
15.4.2 01/18/21  
main.cp : AA_EnableHighDpiScaling  
working on Dialog layouts for 4K monitors  
//-----  
15.4.3 01/18/21  
one line "BLOCKnext()->NextOpticBlock()" still left and caused crash; corrected / Marc's request  
corrections of disable block colors in the left setup panel  
//-----  
15.4.4 01/18/21  
Fixed : Database data save procedure / Andy's request  
//-----  
15.4.5 01/18/21  
Fixed : Wedge dialog- thickness calculation bug  
//-----  
15.4.6 01/19/21  
Ksenia's updates with Dialog layouts  
Corrections in Debug and DebugDelta plots  
//-----  
15.4.7 01/20/21  
Fixed: bug in wedge procedure with lateral implementation in Rotation mode / Marc's request  
//-----  
15.4.8 01/21/21  
Database DBF revision. dbf file destroyed. The code was not running / Ksenia's request  
//-----  
15.4.9 01/22/21  
Bug in BlockUtil (BLOCKnext()->NextOpticBlock()) caused crash in MC / Key's request  
//-----  
15.4.10 01/22/21  
All bop->gom matrices changed to bop->Rgom. Should be tested for mode details  
//-----  
15.4.11 01/22/21  
d_Fit dialog modifications  
Fitting process is still under revision / Kenny's request  
//-----  
15.5.1 01/22/21  
Ksenia's updates with Dialog layouts  
middle number was increased
```

```
//-----
```

15.3.2 01/11/21

### Linux --- issues with Dialogs:

revision of windowFlag in Dialog for "Qt::Dialog" flag

reason : "setWindowFlags(Qt::WindowCloseButtonHint | Qt::WindowTitleHint)" works as

```
Window|WindowTitleHint|WindowSystemMenuHint|WindowCloseButtonHint;
```

All correspondins dialogs have been modified with

```
setWindowFlags(Qt::WindowCloseButtonHint | Qt::WindowTitleHint | Qt::Dialog)
```

```
//-----
```

15.4.1 01/16/21

Global revision of searching optic blocks functions as

```
BLOCKprevious()->PreviousOpticBlock() and BLOCKnext()->NextOpticBlock();
```

**It caused crash.**

---

15.2.3 01/09/21

Key\_Return analysis (M.'s request)

Button "as X,Y" corrected (T.'s request)

Limits for NuclidesTable Zoom In(12)/Out(0.03) (D.'s request)

Graph Title and descriptions font sizes connected to GlobalFontSize (D.'s request)

Wedge font sizes connected to GlobalFontSize (D.'s request)

The left setup panel, Mechanism, About and other dialog font sizes connected to GlobalFontSize

Re-layout of Optics dialogs with the "Block options" frame

d\_Setup\_optics dialog -- modification of vertical header (2 lines)

---

15.2.4 01/09/21

Fixed: crash with ElectricDipole block at the code exit

Fixed: bug in Global matrix calculation with Fit-block

15.2.1 01/08/21

d\_CN\* dialogs were modified for correct selection and regular editing

revision and update of the Global code:  
File management, Toolbar modification, Bugs were fixed, Read/Write operations

**GLOBAL is completely ready**

The screenshot shows the 'Global - results.global' application window. The main interface has a menu bar with 'File' and 'Help', and a toolbar with 'Execute', 'Open', 'Save', and 'About'. The 'Projectile' section contains input fields for A (238), Element (U), Z (92), Z-Q (2), and Initial Energy (430 MeV/u). The 'Target' section contains input fields for A (63.55), Element (Cu), Z (29), and Thickness (100 mg/cm<sup>2</sup>). A 'Loop' section on the right has radio buttons for 'no loop', 'over Z pr', 'over incid', 'over incid', 'over Z tar', and 'over targ'. Below these is a checkbox for 'Output of' and a label 'Plot Q-array f'. The main display area shows the text 'Ready' and a pre-formatted output block:

```

-----
GLOBAL: Q-states of heavy ions behind matter layers
-----
***** Global ***** Version 4.6.4 ***** 08-01-2021 05:19:29
-----
(Z=92 A=238 Qe=2) at E=430.0 MeV/u on (Z=29 A=63.5 D=100 mg/cm^2)
Q-states at target exit (E init):
-----
D(mg/cm2) D_eq Eout Qmean dQ *| Q(0 ) Q(1 ) Q(2 ) Q(3 ) Q(4 ) Q(5 ) Q(6 ) Q(7 ) Q(8 ) Q(9 )
-----
100.00 165.32 422.3 91.25 0.70 *| 4.035e-001 4.493e-001 1.445e-001 2.699e-003 2.415e-005 1.299e-007 4.639e-010 1.157e-012 2.077e-015
  
```

An 'About "Global"' dialog box is overlaid on the right. It features the 'Global' logo and the text 'calculating charge state distributions'. It lists the author 'W. E. Meyerhof' and a citation: 'C. Scheidenberger, Th. Stöhlker, W. E. Meyerhof, H. Geissel, P. H. Mokler, B. Blank Nucl. Instr. and Meth. B 142 (1998) 441'. It also states 'Version 4.6.4' and '08-Jan-2021'. A note mentions that the charge calculation has been ported to MS Windows and C++ by O.B. Tarasov. Another note states the program is a cross-platform application in the Qt framework by M.P. Kuchera. The GUI version is currently maintained by O.B. Tarasov. At the bottom, it provides links for 'Global' ([http://web-docs.gsi.de/~weick/charge\\_states](http://web-docs.gsi.de/~weick/charge_states)) and 'LISE++' (<http://lise.nsci.msu.edu>), along with the 'LISE++' logo.

15.2.2 01/08/21  
Left setup frame layout correction

I2_wedge				
D3	Bp=	4.4895 Tm		
D4	Bp=	4.4895 Tm		
FP_PPAC0	Al	2 mg/cm <sup>2</sup>		
FP_PPAC1	Al	2 mg/cm <sup>2</sup>		
FP_slits	slits			
-25 H +25    -25 V +25				
FP_PIN	Si	504 μm		
FP_SCI	C <sub>9</sub> H <sub>10</sub>	100 mm		
<div style="display: flex; justify-content: space-between;"> <div> <p>config A1900_2019</p> <p>option FRIB_2021</p> <p>version 15.2.1</p> </div> <div> <p>total</p> <p>dp/p</p> <p>1.00%</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>Projectile Fragmentation</p> </div>				

v.15.2.1 on Lab Desktop computer

33 P

32 Si

31 Al

30 Mg

29 Na

28 Ne

27 F

# Versions

**15.1.3 - 15.1.9**

**01/07/21**

15.1.9 01/07/21

Implementation of new parameter NPevapFis :  
Dimension of evaporation distributions for de-  
excitation of fission fragments

**fission settings were changed**

**New fission options**

*fission channel settings were changed*

**Dissipative effects in fission**

- use Krammers's factor
- use Gamma\_f(t) as a step function

Reduced dissipation coefficient "β" (10<sup>21</sup>) / s

β =  ?

reak-up parameters

15.1.7 01/05/21

Correction: G\_EvaporationVelocity value saving in d\_Apf dialog

Correction: moving all "short int" to "int" in declare.h.

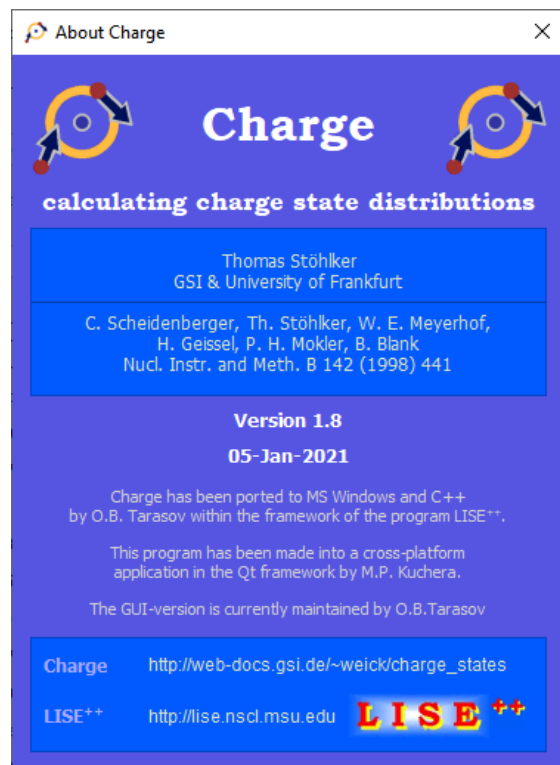
Conflicts in file read/write

**Important for the Option file!**

## code Charge global revision

dialog About : clickable labels, re-layout, colors

MainForm : re-layout, colors



```

Lister - |
File Edit Options Help 90 %
[Projectile]
Z=79
Energy=1000

[Target]
Z=4
Thickness=100
ThicknessAtom=6.682219675677982e+21

[InitFraction]
ZQ0=1
ZQ1=1.34
ZQ2=0.21

[CrossSections]
EIK0_1=0.00179071667152203
EIK0_2=0.0011770891650084074
REC_1=24.48902273847235
REC_2=14.056538143523573
BORN_1=81.67356966308479
BORN_2=165.08206093424488
D_CAPT=0.000179071667152203
D_IONIS=8.16735696630848

[Equilibrium]
ZQ0=0.7566658551375047
ZQ1=0.2250707848128304
ZQ2=0.018263360049664893
EqThickM=1453.194011540674
EqThickA=9.710561616494508e+22
EqThick2_M=732.9658357858115
EqThick2_A=4.897838729487706e+22

[Calc_for_UserConditions]
ZQ0=0.561813549604748
ZQ1=0.38797625773725086
ZQ2=0.05021019265800115

[Condition_ZQ0]
ZQ0=0.8821342128609939
ZQ1=0.11371892531823821
ZQ2=0.004146861820767912

[Condition_ZQ1]
ZQ0=0.3806188383562019
ZQ1=0.5702007010554150
  
```

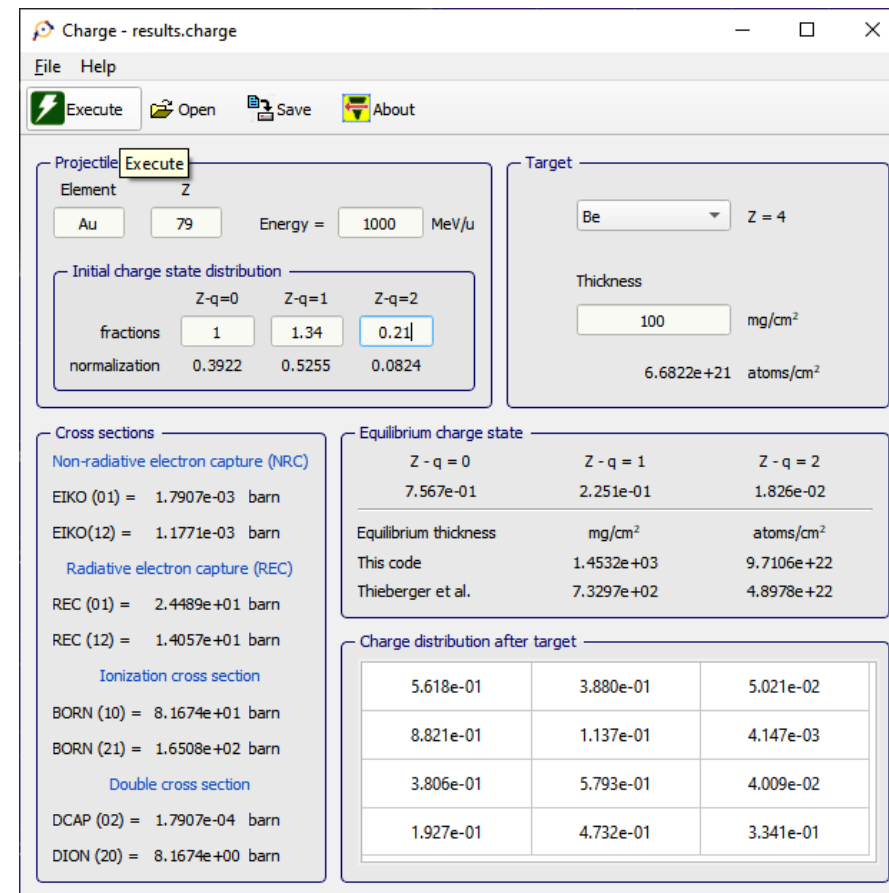
15.1.8 01/06/21

code Charge global revision completed!

corrections in L\_CS\_file were done (Tong's request)

correction in d\_AbrasionFission for Batch-file run

Bug fixed in d\_AbrasionFission -- IFNarray creation



LINK: [http://lise.nsci.msu.edu/15/15\\_1\\_6\\_DiffCS.pdf](http://lise.nsci.msu.edu/15/15_1_6_DiffCS.pdf)

## Differential CS file

**v.15.1.6**  
01/04/21

- Correction of Isotope Differential Cross Section information in LISE file

Reading a DiffCS file from disk and keeping information in LISE++ file

Enter/Read a Cross-section value

Number of saved cross sections

	All CS	Intgd CS	Diff CS
All reactions	1	0	1
This reaction	1	0	1

Projectile\_Target:  $^{42}\text{S} + \text{Be}$

Input new Intgd CS: 2.21e+01 mb

Input (View) Diff CS: 190\_gs.bt

Selected Reaction: Two body reaction

Integral cross sections from models for selected reaction

Intgd CS - Integrated Cross Section  
Diff CS - Differential Cross Section

Preferences: cross sections from (set in the "Preference" dialog)

FILE

```

C:\USEcate\instal\files\temp\4lca.lpp
Save As Print

[===== User Diff CS =====]

[DiffCS0000]
CorrelatedTo=0
Filename=190_gs.txt
Comment= J.Wiza et al., PhysRev 143 (1966) 476 -- Ground state 180(p,d)190* !!!DEGREES
Ex12 = 0.000 0.000
NofPoints = 25
0 10.0837
4.913 9.603
13.27 9.6774
20.043 9.166
29.181 8.7714
37.36 4.6251
46.009 2.628
52.808 1.7452
59.254 1.5278
67.596 1.2505
76.33 1.2466
91.113 0.6146
96.009 0.6121
103.64 0.4527
111.24 0.5465
119.21 0.563
126.43 0.5597
133.26 0.5176
139.71 0.3975
147.69 0.5111
154.9 0.5079
160.98 0.5443
167.81 0.4239
174.45 0.5381
180 0.533014
    
```

LINK: [http://lise.nsci.msu.edu/15/15\\_1\\_3\\_Z\\_vs\\_MaterialThickness.pdf](http://lise.nsci.msu.edu/15/15_1_3_Z_vs_MaterialThickness.pdf)

**v.15.1.3**  
12/30/20

## Z-axis vs. Material Thickness

Help-file will be done later

The Ray-generator dialog

- X [mm]
- X(Theta) [mrad]
- Y [mm]
- Y(Psi) [mrad]
- dPP [°]
- Radial [mm]
- Angle [mrad]
- Energy [MeV]
- TKE [MeV]
- Momentum [GeV/c]
- Beta [°]
- Eta [MJC]
- Length from Target [m]
- Time from Target [ns]
- Energy Loss [MeV]
- Range [mm]
- Reaction
- Cross Section [mb]
- Velocity [cm/s]
- Velocity\_Z [cm/s]
- Velocity\_X [cm/s]
- Velocity\_Y [cm/s]
- Velocity\_XY [cm/s]
- Beta
- Gamma
- Mass [amu]
- A (mass number)
- Z (atomic number)
- N (neutron number)
- q (ion charge)
- Z-q
- A-q
- A-2q
- A-3q
- Z-begin [m]
- Z-end [m]
- 0 (empty)

Oleg Tarasov @ MSU 12/30/2020

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15.1.3 12/30/20

Working on K's requests: dialog layouts, misspelling, etc.

MC envelope plot: Z-axis [m] instead Length [m]

set disable Envelope option for Y-axis

new parameters of MC block : Zbegin & Zend

new MC option: use material thickness in separator length

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15.1.4 01/02/21

correction Show Disabled block checkbox

Mainwindow toolbar modifications

Icon folder revision

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15.1.5 01/03/21

MessageBox for CmFileView has been corrected (DJM)

implementation of GSI\_FRS\_2021.lopt (HW)

Global revision of d\_CS\_differFile, d\_CS\_File dialogs, and L\_CS\_file classes.  
moving from char\* filename to QString because of bug at read/write procedures.

Internal Definition of Option and Config files names in char\* format:  
use in the Left Setup panel and keep in the LISE file header

---

15.1.6 01/04/21

Correction of Isotope Differential Cross Section information in LISE file

Correction of 2D MC plotting in the Differential Cross Section case

"Modifications" ppt-file has been created

Revision of AF example files (Mauricio's request)

AF\_208Pb\_Be.lpp

AF\_238U\_Be\_CS\_fromBigRIPS.lpp -- user RIKEN CS

AF\_238U\_Be\_highZ.lpp -- special settings for high Z (Z>65)

AF\_238U\_C.lpp -- default EERs settings

AF\_238U\_Pb.lpp -- default EERs settings + Coulomb fission

Option file: Reaction type is not changed more with option file loading