

v.16.4.3
07/12/22

Many thanks to Marc and Dave for comments and suggestions

- Account for material lengths in optics
- Update of gas mixture use
- Exponential Abrasion Model (v.16.3)
- LISE⁺⁺ site : secure connection
- Important updates (Reaction mechanism, ETACHA, bugs)
- List of all updates (v.16.2.12-16.4.3)

https://lise.nsl.msu.edu/16/16_4_MaterialAsDrift.pdf

LISE⁺⁺_{cute} : Account for material lengths in optics

v.16.4.1
07/09/22

New version allows to account for the material length in optics and as well in time of flight calculations.

The Block compound in this case is considered as an optical drift block in optical matrix calculations.

Pay attention to use this option for compounds inside of a separator!!!

Z	Element	Mass	Stoich
<input checked="" type="checkbox"/>	8 O	15.999	21
<input checked="" type="checkbox"/>	7 N	14.007	78
<input checked="" type="checkbox"/>	18 Ar	39.948	1

Oleg Tarasov @ MSU 04/06/2022 1

New feature: "gas mixture" message

gasD3

O₂₁ N₇₈ Ar **gas mixture**

Calculate reactions in this material

Account for the material length in optics

Z	Element	Mass	Stoch
<input checked="" type="checkbox"/>	8 O	PT 15.999	21
<input checked="" type="checkbox"/>	7 N	PT 14.007	78
<input checked="" type="checkbox"/>	18 Ar	PT 39.948	1

Compound dictionary

OK Cancel

Density: 0.0012 g/cm³ Calculate density

State of Matter: Solid Gas

Dimension: mg/cm² & micron g/cm² & mm

Angle: Calculate 0 degrees

Thickness at 0 degrees Effective Thickness

Gas density

O₂₁ N₇₈ Ar

Molecular formula

Gas mixture

Input Average Molar Mass in the case of gas mixture. For example M=28.97 for air, or M=37.6 for P-10 gas

Molar mass = 28.97

Parameter	Value	Dimension
Temperature (K)	293.15	K
Pressure (Torr)	760 760	Torr
Density	1.2044 1.2044	mg/cm ³ kg/m ³ g/L

Units converter Fix Cancel

Some compounds in `../lisecfg/compound.dat` file contain the molar mass value that tells LISE++ that this gas is a mixture

```
Xylene,H10 C8,0.8611
* Gases
Acetylene,H2 C2,0.0010825
Air (gas mixture),O21 N78 Ar1,0.001209,28.97
Allene Propadiene,H4 C3,0.0016656
Ammonia,H3 N1,0.00070804
Butane,H10 C4,0.0024164
```

http://lise.nsl.msui.edu/16/16_3_ExpAbrasion.pdf

LISE⁺⁺_{cute} : Exponential Abrasion Model

v.16.3.1
04/06/22

- Exponential Abrasion Model implementation to LISE⁺⁺_{cute}
- Use of the Excitation energy fissile nuclei parameters from the BeAGLE calculations in LISE⁺⁺_{cute}
- LISE⁺⁺_{cute} Abrasion-Fission 3 EER with the EIC settings
- Comparison of calculation results of different models
- Fission Fragment Kinematics

File Explorer: This PC > Documents > LISEcute > files > examples > afission

Name	Status	Date modified
AF_208Pb_Be.lpp		10/1/2021 2:27 PM
AF_238U_Be_CS_fromBigRIPS.lpp		10/1/2021 2:27 PM
AF_238U_Be_highZ.lpp		10/1/2021 2:22 PM
AF_238U_C.lpp		10/1/2021 2:24 PM
AF_238U_Pb.lpp		10/1/2021 2:27 PM
ExpAbrasionModel.lpp		4/6/2022 3:07 AM

LISE ++ [C:\LISEcute\install\files\examples\afission\ExpAbrasionModel.lpp]

The software interface shows various settings for the experiment:

- Projectile:** 238 U 92+, 110 GeV/u, 1e+3 pps
- Fragment:** 132 Sn 50+
- EERs:** 227 U(34), 223 Pa(86), 228 Ra(206)
- Target:** 1 H 1 mm
- Stripper:** (empty)
- D1:** Bp=992.5035 Tm
- H1_slits:** slits
- FP_PIN:** Si 504 μm
- FP_SCI:** CsI 100 mm

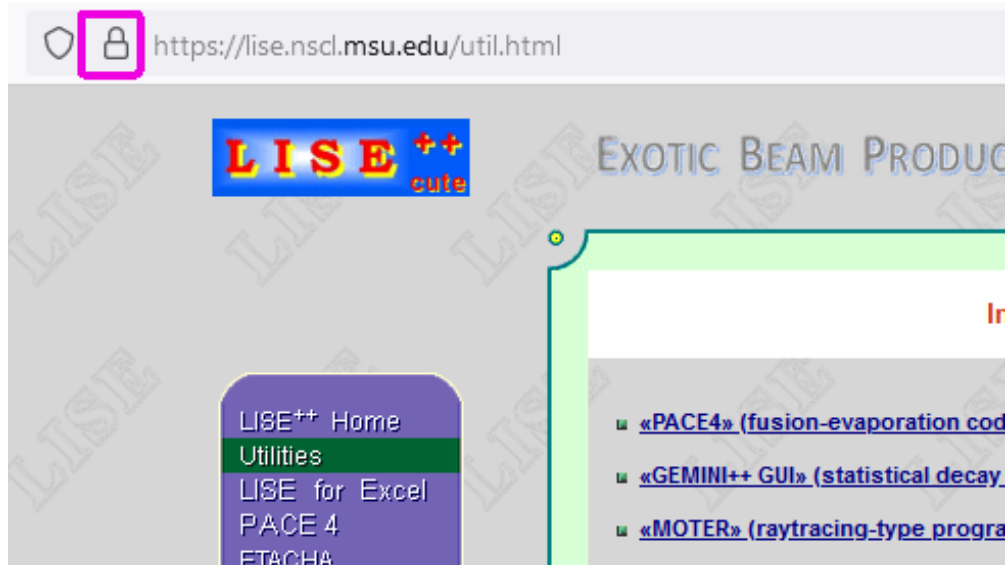
A 3D visualization shows a green projectile entering a target assembly with various components like a stripper and detectors.

Oleg Tarasov @ MSU 07/12/2022

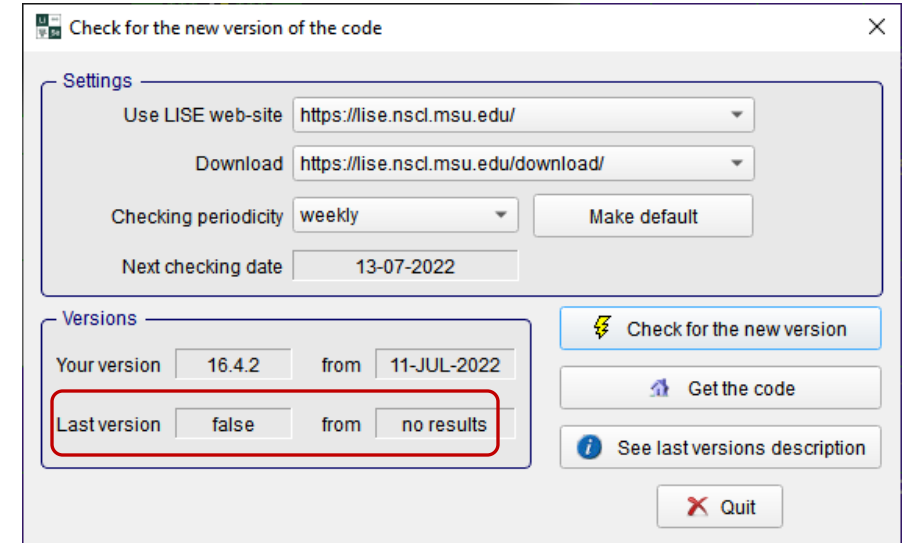
4

Thanks to Greg Comins!

http → https



New approach for visitor statistics.
It allows to get the code downloading statistics.



Unfortunately, the "New version" dialog is currently not operating outside the FRIB net. It will be solved soon.

v.16.3.7:

OT's manual correction for light charge particles production cross section can be applied for all PF models (before it was used only for EPAX2.15-user)

v. 16.2.27

04/01/22

The Convolution model : each option has its own σ_0 value

Convolution of Gaussian (Fragmentation) and Exponent (Friction) distributions

$^{48}\text{Ca} (140.0 \text{ MeV/u}) + \text{Be} \rightarrow ^{42}\text{S}$

Settings for Gaussian distribution

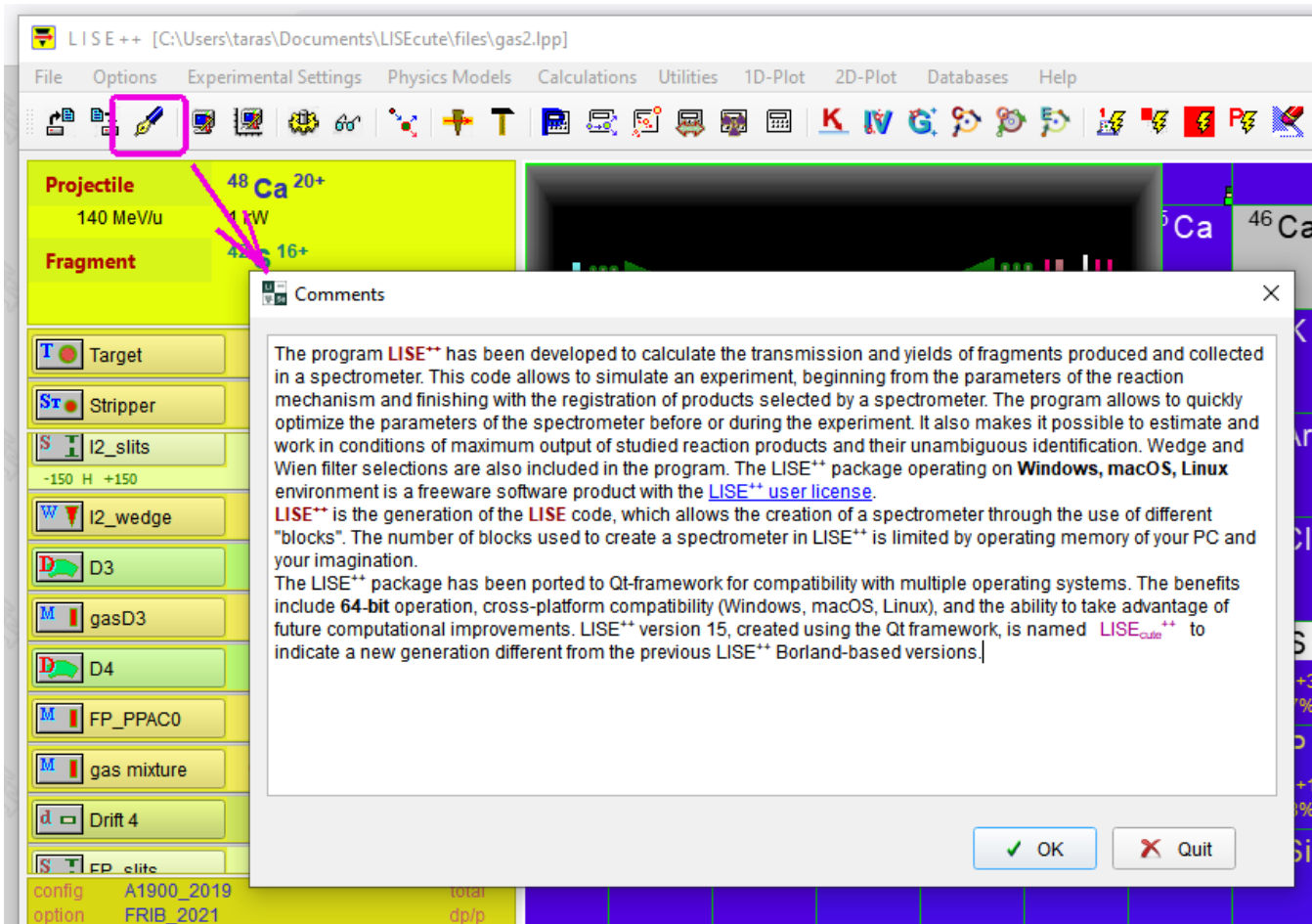
$P_0 (\text{MeV/c}) = 22226$
 $V_F / V_B \text{ from settings} = 0.994$
 Mom.distribution = [1] D.J.Morrissey
 $\sigma_0 = 87 \text{ MeV/c}$
 $\sigma_{11} = 244.5 \text{ MeV/c (*)}$

Settings for convolution

Separation Energy Model	$E_{\text{separation}}$	σ_0^{conv}	coef	shift	FWHM / 2.355 (*)	tau	P (Y_{max})	V_F / V_B peak	V_F / V_B mean
<input type="radio"/> 0. Energy from Qg	26	91.5	3.344	0.158	183.9	231.3	22079	0.997	0.993
<input type="radio"/> 1. Excitation from dSurface	11.7	91.5	3	0.149	157.1	139.2	22137	0.998	0.996
<input checked="" type="radio"/> 2. Excitation from the Abrasion model	41.2	125	1	-1	184.2	87.1	22094	0.995	0.994

$\sigma_0^{\text{conv}} = 125 \text{ MeV/c}$ $g = 0.95 \text{ MeV/fm}^2$ (*) - with γ -factor

Buttons: Plot 1D, Convolution Analysis, Make default, OK, Cancel, Help



 16.2.23 03/29/22
 comments action in toolbar; comment icon in file menu

16.2.22 03/29/22
 comments: summarize all comments from files in the case of
append operations

16.2.21 03/29/22
 comments: summarize all comments from files in the **lise files list**

ETACHA 4.4.11	05/30/22	batch mode with command string argument -r
ETACHA 4.4.10	05/30/22	Correction with a density value input from file
ETACHA 4.4.09	05/30/22	Plot option in etacha file

The option -r suppresses the graphs and the input window.

The screenshot shows the ETACHA4 software interface. The 'Show Results' section is highlighted with a red box, indicating that the 'Plots' option is checked. The interface includes various input fields for projectile and target parameters, integration models, and numerical uncertainties.

HW's request

```
PS C:\Program Files\LISEcute> .\ETACHA4.exe D:\test.etacha -r
```

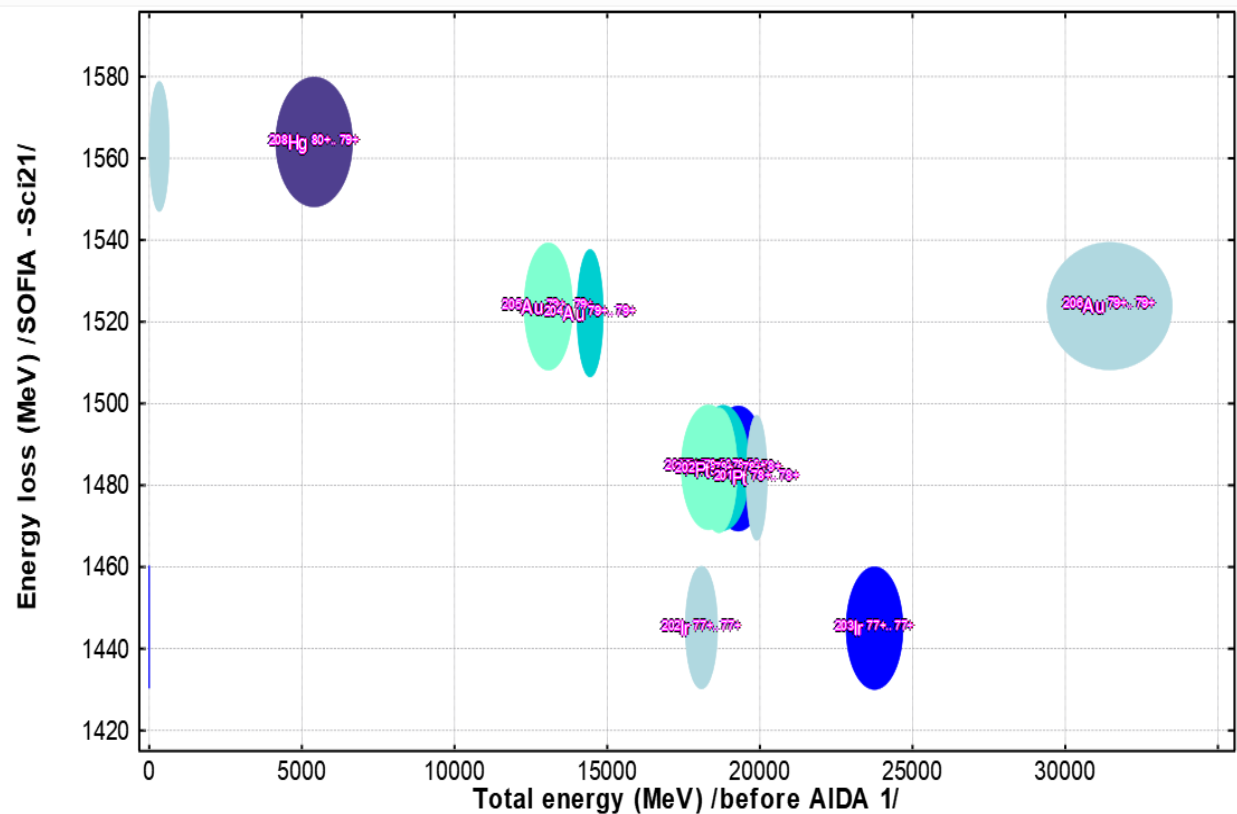

DJM’s request

[corrected] Incorrect extrapolation of energy for isotopes completely outside the slits in the case of transmission calculations by the “ellipse” method

before

dE-TKE

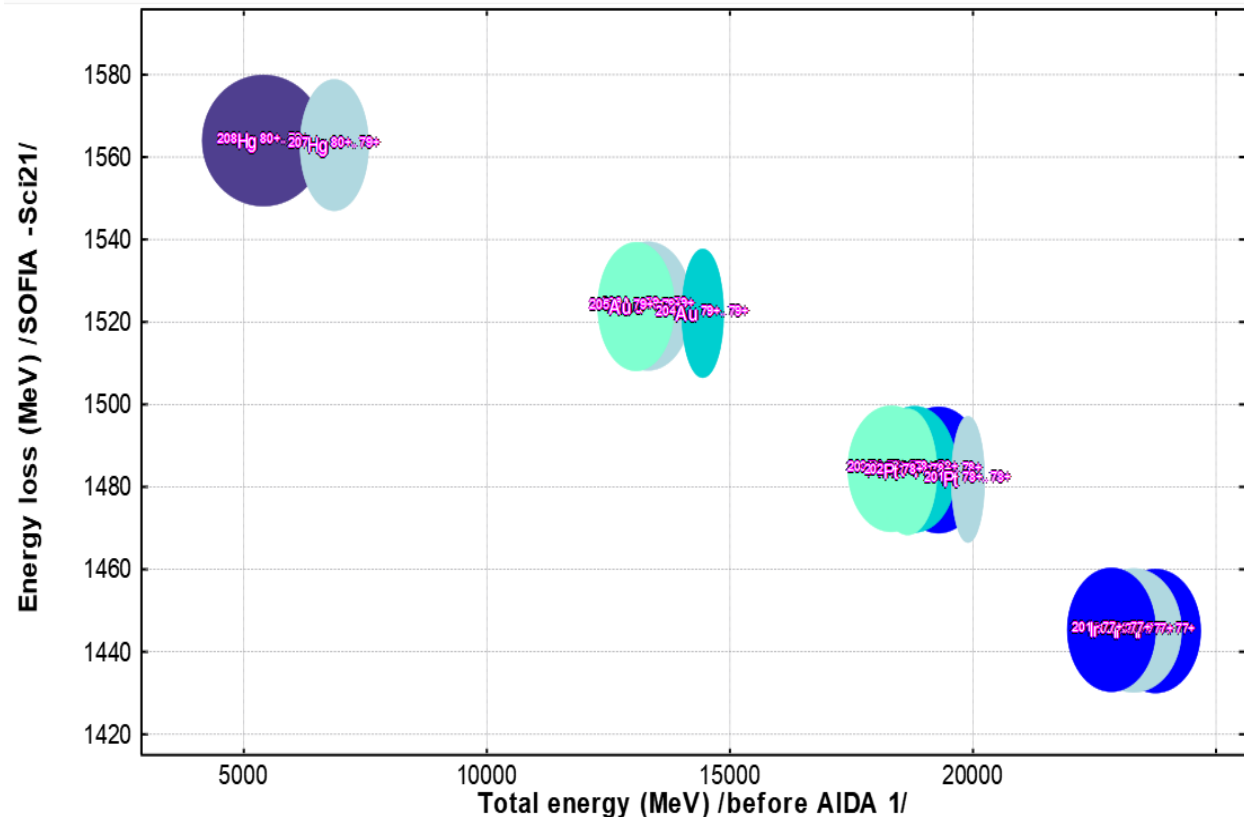
^{208}Pb (999.16 MeV/u) + Be (1625 mg/cm²), Nb (220 mg/cm²); Settings on $^{204}\text{Pt}^{78+}$; Config: |D|,D|,.....D|D,.....d
 dp/p=2.54%; Wedges: 0, Al (4500 mg/cm²), Al (3765 mg/cm²); Brho(Tm): 13.6495, 13.6495, 10.0748, 10.0748
 1st TKE detector: AIDA 1 ** dE: SOFIA -Sci21 - H11C10 (1 mm)



after

dE-TKE

^{208}Pb (999.16 MeV/u) + Be (1625 mg/cm²), Nb (220 mg/cm²); Settings on $^{204}\text{Pt}^{78+}$; Config: |D|,D|,.....D|D,.....d
 dp/p=2.54%; Wedges: 0, Al (4500 mg/cm²), Al (3765 mg/cm²); Brho(Tm): 13.6495, 13.6495, 10.0748, 10.0748
 1st TKE detector: AIDA 1 ** dE: SOFIA -Sci21 - H11C10 (1 mm)



16.3.33 07/09/22

fixed: w_Graph_Envelope crash. (MH)

mostly it has been moved from char*" to QStringSize

16.3.11 05/30/22

InitFN_AF_Dlg::CmPrintTitles correction with titles

16.3.9 05/30/22

misspelling corrections in dialogs d_CNO_scanningEnergy and d_CNO_scanningBrho (MH)

16.3.8 05/11/22

two missing .toString().c_str() in c_Plot_MC.cpp (DB)

16.3.6 04/23/22

correction in angular distribution for the fusion-residual (p,g) case (119I from 118Te beam)

16.3.5 04/23/22

correction in the fusion-residual case for very thin target

16.3.4 04/20/22

* Fixed: crash (only in debug mode) in O-AA_manage.cpp

16.3.2 04/12/22

QSstrcpy and QSstrncpy modifications in win_utilString.cpp (TZ)

16.2.38 04/06/22

initialization beam.Shapes[i] to 1

16.2.30 04/01/22

Fixed: memory leak in read/write blocks

16.2.29 04/01/22

Fixed: bug in file append procedure with high order matrices

16.2.14 03/22/22

Fixed: Results->Transmission A,Z,q1 (summarized by reaction) ==> bug with stripper charge state value

16.2.13 03/22/22

Fixed: Random wrong initialization of root directory (only in Windows) (MH)

16.2.12 03/22/22

Fixed: bug in d_Setup_Array after privateName value retyping to QString (MH)

16.4.3 07/12/22
PseudoMC update for UseLengthOptics=1

16.4.2 07/11/22
update Draw PlotFile functions for pure ascii output (no Borland, no HTML) (StSc)

16.4.1 07/11/22 changing middle version

16.3.36 07/09/22
modification LengthNameCompound from 61 to 76
modification LengthNameCompoundPlusMass from 78 to 100

16.3.35 07/09/22
update FillTitlePlot for Wedge graph name and Brho greek

16.3.34 07/09/22
new BLOCK function bool isLengthBlock() connected to material
UseLengthOptics=1, update BLOCK_util for isLengthBlock()

16.3.33 07/09/22
fixed: w_Graph_Envelope crash. (MH)
mostly it has been moved from char** to QStringSize

16.3.30-32 07/08/22
MC envelope update for UseLengthOptics=1
TOF p_Block_util update for UseLengthOptics=1
p_Block_polynom update for UseLengthOptics=1

16.3.29 07/08/22
MC_options => always opt->MC_Zaxis_material=1,
now opt->MC_Zaxis_material is used as flag in PassMaterialBase for
UseLengthOptics=1

16.3.28 07/08/22
d_Setup_Optics -> CmBeamSigmaPlot -> update for UseLengthOptics

16.3.27 07/08/22
d_Setup_Optics -> CmMatrixEnvelope -> update for UseLengthOptics

16.3.26 07/08/22
d_Setup_Optics -> CmMatrixFile -> update for UseLengthOptics
correction in p_Block_Compound for om->Unit in the case of drift

16.3.25 07/05/22
d_Thick dialog update for UseLengthOptics, W_Scheme update for
UseLengthOptics, different color and size for materials with lengths
o_Optics update for UseLengthOptics in RecalculateGOM, p_Block_Compound for
UseLengthOptics in blockLength for optical matrix

16.3.24 07/05/22
Config_read & w_rite updates for block_material length use in optics
new function templates in BLOCK_Compound
int getUseLengthOptics(){return UseLengthOptics;};
void setUseLengthOptics(int init){ UseLengthOptics = init>0 ? 1 : 0;};

16.3.23 07/05/22
Config_read & w_rite updates for gas mixture molar value

16.3.22 07/03/22
update d_Thickopt_compound to read gas mixture molar value

16.3.21 07/03/22
Ctarget::input_thickness call in Ctarget

16.3.20 06/30/22
Option Show/Hide Cancel-button in Gauge button. used for initial Table
creation

16.3.19 06/30/22
Material dialog - the Z cell is hidden if this component does not exist

16.3.18 06/30/22
modification of compound.dat file for molecular mass
molecular-Mix mass flag in Ctarget class --> later w as erased

16.3.17 06/30/22 new NNDC isotope link

16.3.16 06/29/22
d_Thick : new CheckBox "Use Length in Optics
BLOCK_Compound : int UseLengthOptics

16.3.15 06/29/22
new icon plotsaveMC, plot_save icons modification (StSc)

16.3.14 06/29/22
c_Plot_2 -> Actions : Save Plot for mode=20 (Ellipse)

16.3.13 06/29/22
c_Graph2_goodies : PassSlits -> CutSpace -> USEAnalysis=false for
isotopes out of slits

16.3.12 06/26/22
c_Graph2_goodies : PassSlits only for optical blocks

16.3.11 05/30/22
InitFN_AF_Dlg::CmPrintTitles correction with titles

16.3.10 05/30/22
Physical Calculator : increasing output precision (AG)

16.3.9 05/30/22
misspelling corrections in dialogs d_CN0_scanningEnergy and
d_CN0_scanningBrho (MH)

16.3.8 05/11/22
two missing .toString().c_str() in c_Plot_MC.cpp (DB)

16.3.7 05/06/22
OT's manual correction for light charge particles production
cross section can be applied for all PF models

16.3.6 04/23/22
correction in angular distribution for the fusion-residual (p,g) case (119lf from
118Te beam)

16.3.5 04/23/22
correction in fusion-residual for very thin target

16.3.4 04/20/22
* attempt to use SSL protocol in the new version dialog
* Fixed: crash (debug mode) in O-AA_manage.cpp because of char buff[20];

16.3.3 04/15/22
https: instead http: for LISE site links

16.3.2 04/12/22
QSstrncpy and QSstrncpy modifications in win_utilString.cpp (TZ)

16.3.1 04/06/22
new middle version http://lise.nslc.msu.edu/16/16_3_ExpAbrasion.pdf

16.2.39 04/06/22
files\examples\afission\ExpAbrModel.lpp -- settings for Exponential abrasion
with EIC parameters

16.2.38 04/06/22
initialization beam.Shapes[i] to 1

16.2.37 04/06/22
modifications in the Abrasion-Fission dialog and plot

16.2.36 04/06/22
double Sigma0convolution parameter --> double Sigma0convolution() function

16.2.35 04/04/22
ExpSlope abrasion: Nuclide CS map development

16.2.34 04/04/22
ExpSlope abrasion: including to AAcompare project, ApfExcitatio dialog
modification

 16.2.33 04/04/22
 COSY map default file extensions are "map" and "mat" for loading

16.2.32 04/02/22
 Update of FRIB_2022.lopt (default option file)

16.2.31 04/01/22
 global revision in read/write blocks with new elements of Zagolovok and Vegas classes

16.2.30 04/01/22
 Fixed: memoryleak in read/write blocks

16.2.29 04/01/22
 Fixed: bug in file append procedure with high order matrices

16.2.28 04/01/22
 Read/Write --> struct Zagolovok to class, struct Vegas -> class
 zero initialization of char* in these classes
 High order class : HOL - new function init(const*str)
 no more some functions in Vegas class (alloc, free, read_func)

16.2.27 04/01/22
 Convolution model : each option has its own sigma0 value

16.2.26 04/01/22
 COSY map default file extension is "map"

16.2.25 04/01/22
 new default option file FRIB_2022.lopt
 correction in "writing rays to file" order in option file

16.2.24 04/01/22
 No more modal property for the File comments dialog
 writing high order optics element format increased to %.e5

16.2.23 03/29/22
 comments action in toolbar; comment icon in file menu

16.2.22 03/29/22
 comments summarize comments in the case of append operations

16.2.21 03/29/22
 comments summarize comments of all file in lise-files list

16.2.20 03/27/22
 direct multipole dialog edit after clicking on the table in the Optics Seup dialog

16.2.19 03/26/22
 global substitution for strReactionRegl function

16.2.18 03/26/22
 new Functions QString strReactionRegl(Celement*el, double energy, Compound* compound,
 Celement*el2, bool);

16.2.17 03/26/22
 class Element and Compound -- implementation of QString for name

16.2.16 03/24/22
 new Abrasion model : Exponential -- only Dialog and initialization

16.2.15 03/23/22
 new function chargeStateTrans(const Ccalc* cc) : product of all charge state transmission values
 for one ion

16.2.14 03/22/22
 Fixed: Results->Transmission A,Z,q1 (summarized by reaction) ==> bug with stripper charge state
 value

16.2.13 03/22/22
 Fixed: Random wrong initialization of root directory (only in Windows) (MH)

16.2.12 03/22/22
 Fixed: bug in d_Setup_Array after privateName value retyping to QString (MH)
 ARIS.blf file has been updated by MH
