LISE development 16.16.14 - 16.17.02

v.16.17.02
07/24/23

- LISE package optimization (phase 2)
- Compiling with MSVC
  - MSVC “long double” issue
  - Factorial : new class “tripleValue”
- Abrasion-Ablation model update
  - dR – tunneling
  - Exponentional <T> EE model update
- List of last modifications

- Transmission calculation speed ratio between v.16.15 vs. 16.17 (MinGW) is almost factor 2
- Transmission calculation speed ratio between v.16.17 MinGW and v.16.17 MSVC is factor 1.63

LISE package optimization (phase 2)

version	compiler	release date	time elapsed (sec)		Average factor
			124Xe, EPAX, charge states	198Pt, Abrasion-Ablation charge states	
13.4	Borland(32)	5/5/2020	206	685	12.40
16.3.1	MinGW	4/6/2022	99	290	5.60
16.14.20	MinGW	4/26/2023	50	187	3.20
16.16.14	MinGW	7/25/2023	48	167	2.96
16.16.34	MinGW	8/12/2023	35	90	1.86
16.17.2	MinGW	8/18/2023	28	87	1.63
16.17.2	**MSVC**	8/18/2023	17	54	1.00

Project by S.Tarasova: search for time-consumed nodes (weeks 31-33)

Compiling with MSVC

Desktop_Qt_6_5_2_MSVC2019_64bit

https://lise.nscl.msu.edu/download/Windows/

Index of /download/Windows

Name	Last modified	Size	Description
Parent Directory		-	
LISE_RayReader/	2023-07-25 04:21		
LISEcute++_16_17_2.exe	2023-08-18 23:29	38M	
LISEcute++_16_17_2_MSVC.exe	2023-08-18 23:15	40M	
open_version/	2023-08-18 23:18	-	
other/	2023-08-18 23:18	-	

Compiler indicator

MSVC, optimization

DoublePrecision = (sizeof(double) != sizeof(long double));

- MSVC doesn't support "long double"
- It was necessary to modify LISE to avoid crashes in corresponding functions as factorial() for abrasion of nuclei up to A=300
- Construction of new class "tripleValue"

```
class  tripleValue {

public:

  tripleValue();
  tripleValue(double init);
  tripleValue(const tripleValue& other);

  tripleValue& operator = (const tripleValue& other);
  tripleValue operator * (double factor);
  tripleValue operator * (const tripleValue& other);
  tripleValue operator / (const tripleValue& other);



  double mantissa;
  int order;
  bool positive;

  void multi(double v);
  void divide(double v);
  void optimize();

  double getDouble();
};
```

Factorial array is tabulated for speed

NEW

```
tripleValue factorial0(int A)
{
#define arrNO 400
static tripleValue array[arrNO+1];

  if(array[1].mantissa==0)
    {
      array[0] = tripleValue(1);
      array[1] = tripleValue(1);

      for(int i=2; i<=arrNO; i++)
          array[i] = array[i-1] * i;
    }

A = qMin(A,arrNO);
return array[A];
}
```

OLD

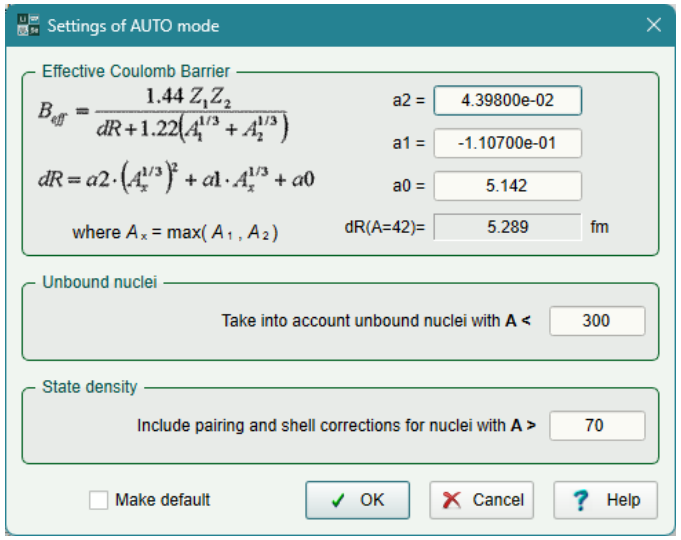
```
long double combi_factorial(int Aup, int Adown)
{
  if(Aup > Adown) return 1;

  long double f1 = factorial(Aup);
  long double f2 = factorial(Adown-Aup);
  long double f3 = factorial(Adown);
  long double res = f1*f2/f3;

  return res;
}
```

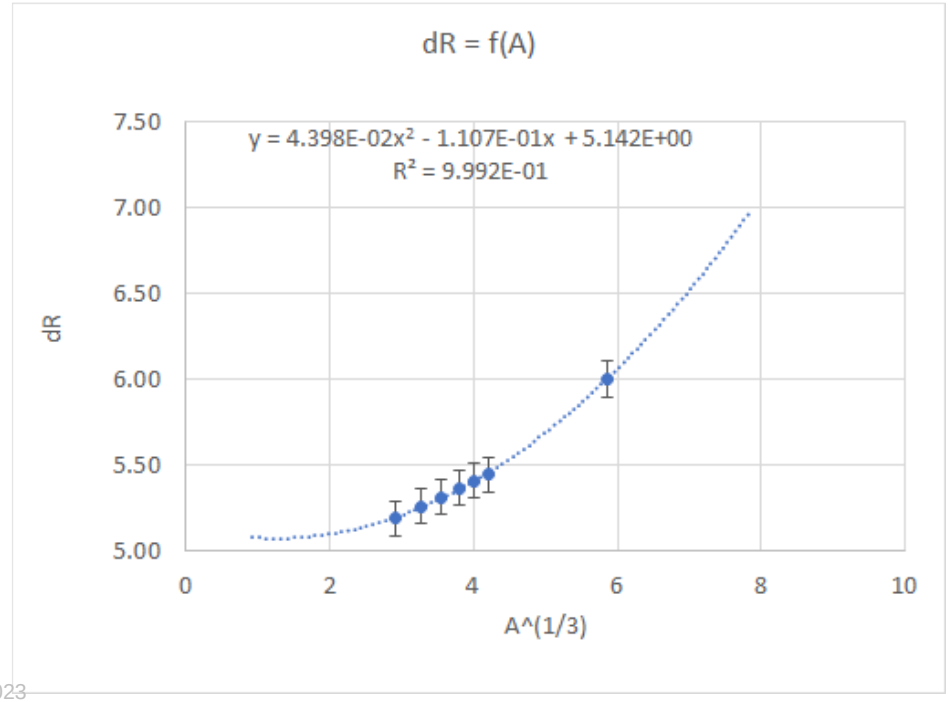
NEW

```
tripleValue combi_factorial0(int Aup, int Adown)
{
  if(Aup > Adown) return 1;

  tripleValue f1 = factorial0(Aup);
  tripleValue f2 = factorial0(Adown-Aup);
  tripleValue f3 = factorial0(Adown);
  tripleValue res = f1*f2;
  tripleValue res2 = res / f3;

  return res2;
}
```

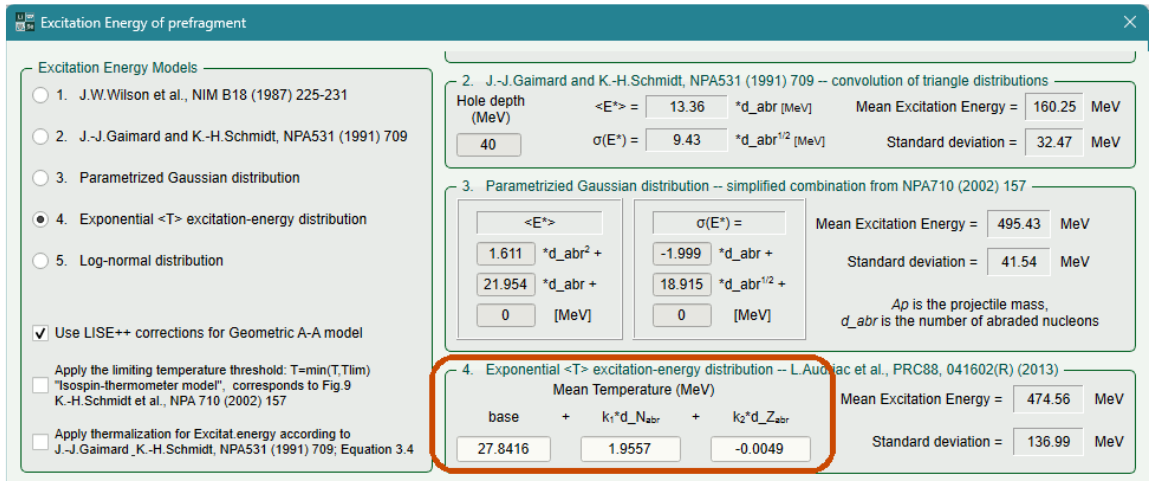
Abrasion-Ablation model update

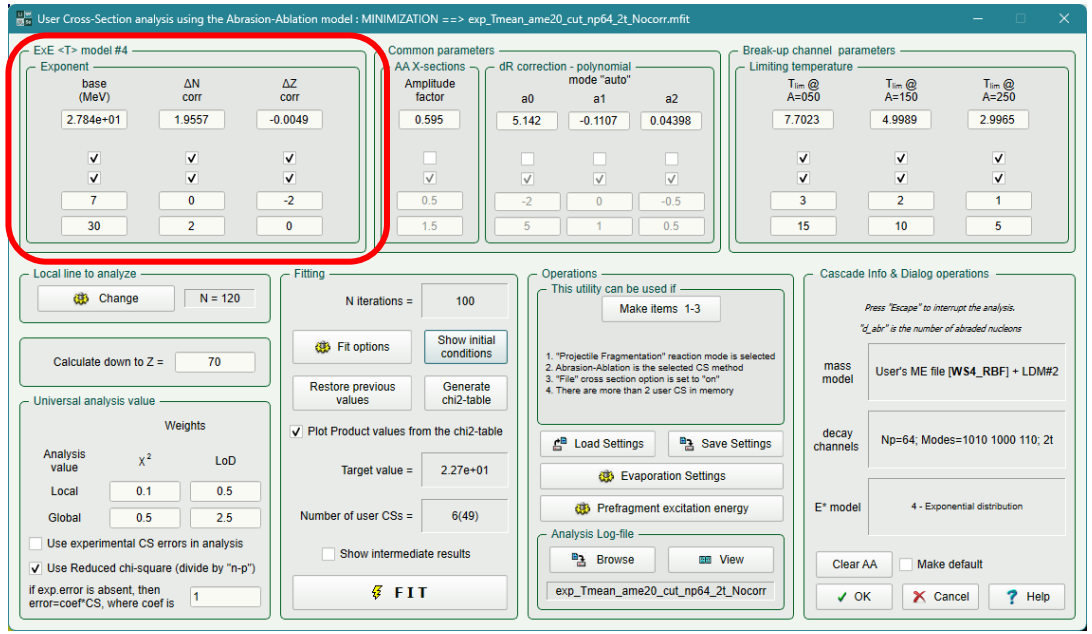
dR – tunneling: obtained from ^{78}Kr (RIKEN data) analysis





Exponentional <T> EE model update
Based on 198Pt (MSU data) analysis





LISE package optimization (phase 2)

16.16.14	07/25/23	PACE4 - migrating to sqlite format
16.16.15	07/31/23	optimization of get_i_xmin & get_i_xmax based on Sasha's analysis
16.16.16	07/31/23	optimization of inter2 based on Sasha's analysis
16.16.17	07/31/23	Cosmetic update of d_Data_Minimization
16.16.18	07/31/23	no drift and fit blocks for block selection in wedge profile and kicker dialogs
16.16.19	08/01/23	Bug correction in AbraAbla::Calculate
16.16.20	08/01/23	minimum size hints for Apf_Excitation, Apf & Evaporation
16.16.21	08/02/23	increasing precision for excitation energy parameters to display and save
16.16.22	08/03/23	d_Data_minimizationFit : implementation dR_auto group box for minimization
16.16.23	08/03/23	AA_compare modification for dR auto parameters
16.16.24	08/03/23	d_Data_minimizationFit: correction for prinitng final values
16.16.25	08/03/23	Big fixed with opening non-existent COSYfile from Matrix dialog
16.16.26	08/05/23	gloRange optimization with new finction double polynom() based on Sasha's results bipoco1s optimization with new finction double polynom()
16.16.27	08/05/23	new default parameters for dR_auto
16.16.28	08/05/23	d_Data_minimizationFit update: no AA gauge, Graph dim25 scale
16.16.29	08/08/23	TransPrev/All -> ActivateTable after 30events
16.16.30	08/10/23	new default parameters for dR_auto y = 4.398E-02x2 - 1.107E-01x + 5.142E+00
16.16.31	08/11/23	new link on FRIB beam List
16.16.32	08/11/23	Exponentional Tmean EE: two new parameters G_MeanTN & G_MeanTZ
16.16.33	08/11/23	Exopnentional Tmean EE: d_Apf_excitation
16.16.34	08/12/23	Exopnentional Tmean EE: d_Dat_minimizationFit
16.16.35	08/12/23	d_Apf: low threshold for even gap is -10
16.16.36	08/16/23	Bugs fixed in Gemini and PACE4
16.16.37	08/16/23	compilation MinGW and MSVC version 6.5.2
16.16.38	08/17/23	L_Distribution: implementation new funcitons add, input, mult noClear() to improve speed based on Sasha's analysis
16.16.39	08/17/23	L_Distribution: modification of some functions to const
16.16.40	08/17/23	implementation of delta for acceleration of ShellCorrect
16.16.41	08/17/23	Shell correction masstable in mass class update of DeltaShellCorrect() for Shell correction masstable
16.16.42	08/18/23	global variable bool DoublePrecision for long_double test important for long double myexpl()
16.16.43	08/18/23	new class "tripleValue" to operate with large-scale numbers; important for factorials
16.17.01	08/17/23	middle version has been changed
16.17.02	08/17/23	Factorial calcualtions were turned to work with class "tripleValue“; MSVC issue with “long_double=double” has been solved for mexpl and factorial