



LISE for Excel-64

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Introduction

Motivation

- EXCEL has two versions 32 and 64 bit, and each uses the corresponding type of dynamic-link library(.dll)
- LISE for EXCEL was originally compiled in 32 bit and hence only works in the 32 bit version of EXCEL
- EXCEL and LISE have both changed a great deal since LISE for EXCEL was made so much has to be updated

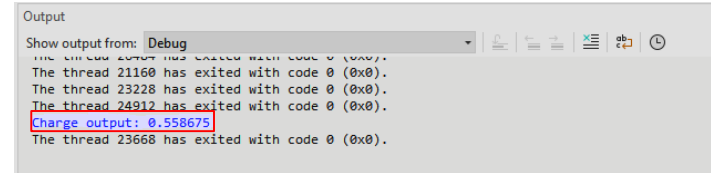
Goals

- Create a new updated LISE for EXCEL dll that is compiled in 64 bit
- Update the EXCEL workbook with the correct VBA code
- Have LISE for EXCEL work with both the MINGW and MSVC versions, and possibly MacOS and Linux.

Method

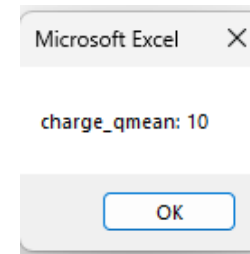
Method

- Using the old LISE Borland code I obtained a list of all of the required functions, and how some are setup
- Convert all of the old long variables to doubles in both the C++ and VBA code
- Use Visual Studio to debug EXCEL and see what functions, variables, and files are needed for the dll to run.
- Add the new variables and functions LISE now needs to function
- Update the VBA code to use the new PtrSafe declarations and some other slight adjustments
- Compile using only the required source and header files to minimize dll size



```
Output
Show output from: Debug
The thread 21160 has exited with code 0 (0x0).
The thread 23228 has exited with code 0 (0x0).
The thread 24912 has exited with code 0 (0x0).
Charge output: 0.558675
The thread 23668 has exited with code 0 (0x0).
```

An example of the debug output given by Visual Studio



EXCEL Macro output used to test the functions

Method (Issues Encountered)

Issues

- Excel Doesn't often tell you what dlls are missing instead it just spits out a generic error
- LISE is dependent on the LISE window opening to initialize variables
- Excel couldn't find the location of the Sql drivers used to read tables
- MSVC was crashing repeatedly when trying to do W_ME_Extrapolate

```
'EXCEL.EXE' (Win32): Loaded 'C:\Windows\System32\winspool.drv'.  
QSqlDatabase: QSQLITE driver not loaded  
QSqlDatabase: available drivers:  
QSqlDatabase: QSQLITE driver not loaded  
QSqlDatabase: available drivers:  
QSqlQuery::prepare: database not open  
Failed to find for s_mass: "Driver not loaded Driver not loaded"  
QSqlQuery::prepare: database not open  
Failed to find for s_mass: "Driver not loaded Driver not loaded"  
The thread 9520 has exited with code 0 (0x0).  
The thread 29656 has exited with code 0 (0x0).  
The thread 10816 has exited with code 0 (0x0).
```

Solutions

- The generic error means a dependency is missing. Said dependency can be found using dependency walker.
- Modify LISE's initialization functions to initialize only the needed variables and call said functions when the dll is loaded not when LISE is opened.
- Point the program to where the Plugins are installed and manually load them prior to their use.
- MSVC and MinGW use different SQL dlls. If the incorrect library is being used Excel will fail to read in s_mass. This will cause W_ME_Extrapolate to enter an infinite loop and crash.

Changes

Back End

- Update the LISE and VBA code to use Doubles instead of long values
- Modified Lise code to be compatible with the lib format and only initialize the variables we need
 - Went from 16MB to 2MB after removing Unnecessary files
- General updates to VBA code because of the version change from 32bit to 64 bit
- Added three new mass functions
 - Mqe - mass without qe-electrons
 - Mqq - mass without q electrons
 - Matom - atomic mass

Front End

- Added new energy loss methods

Energy loss calculation method		Charge State calculation methods		Energy Straggling calculation methods		names	
0 - Hubert 1 - Ziegler 2 - ATIMA		0 - Winger 1 - Leon 2 - Shima 3 - Global+Winger 4 - Global+Leon 5 - Schiwietz (solid)		0 - Anne 1 - ATIMA		Zparticle: 30 Aparticle: 64 Ztarget: 6 Atarget: 12 Energy: 300 Thickness: 5 ZmQ: 0	
current state = 2		current state = 3		current state = 1		you may change values of top cells	
Stopping power	Hubert - option=1	Zparticle, Aparticle Energy (MeV/u) Ztarget	0.00003	MeV/(mg/cm2)			
Stopping power	Zigler - option=1	Zparticle, Aparticle Energy (MeV/u) Ztarget	0.00003	MeV/(mg/cm2)			
Stopping power	Atima - option=2	Zparticle, Aparticle Energy (MeV/u) Ztarget	0.00003	MeV/(mg/cm2)			
Stopping power	Atima without LS - option=3	Zparticle, Aparticle Energy (MeV/u) Ztarget	0.00003	MeV/(mg/cm2)			

Energy loss calculation method		Charge State calculation methods		Energy Straggling calculation methods		names	
0 - Hubert 1 - Ziegler 2 - ATIMA 3 - ATIMA No LS 4 - ATIMA H. Weick		0 - Winger 1 - Leon 2 - Shima 3 - Global+Winger 4 - Global+Leon 5 - Schiwietz (solid)		0 - Anne 1 - ATIMA		Zparticle: 30 Aparticle: 64 Ztarget: 6 Atarget: 12 Energy: 300 Thickness: 5 ZmQ: 0	
current state = 2		current state = 3		current state = 1		you may change values of top cells	
Stopping power	Hubert - option=1	Zparticle, Aparticle Energy (MeV/u) Ztarget	2.85162	MeV/(mg/cm2)			
Stopping power	Zigler - option=1	Zparticle, Aparticle Energy (MeV/u) Ztarget	2.84096	MeV/(mg/cm2)			
Stopping power	Atima - option=2	Zparticle, Aparticle Energy (MeV/u) Ztarget	2.87367	MeV/(mg/cm2)			
Stopping power	Atima without LS - option=3	Zparticle, Aparticle Energy (MeV/u) Ztarget	2.81294	MeV/(mg/cm2)			
Stopping power	Atima H. Weick - option=4	Zparticle, Aparticle Energy (MeV/u) Ztarget	2.86184	MeV/(mg/cm2)			

Summary

Conclusion

- LISE for Excel now works on 64 Bit Systems and the code base has been tied to LISE so both get updated
- Very minimal changes to the User experience if any
- Comes with the latest version of LISE [here](#)

Troubleshooting

- Excel is saying the workbook is untrusted
 - Go to Trust Center under Options and click Trust Center Settings...
 - Under Trusted locations select add new location and select the folder LISE for Excel is in

