LISE for Excel-64

Daniel Kaloyanov

Research Assistant
kaloyano@frib.msu.edu

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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
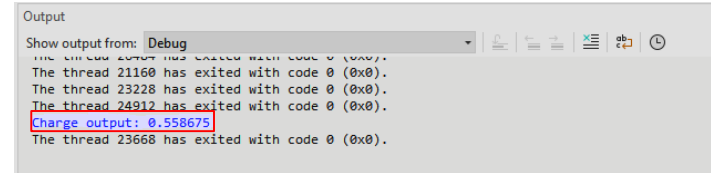
Goals

- 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.
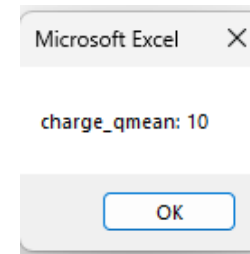
Method

- 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

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

- 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

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

FRIB
Facility for Rare Isotope Beams
U.S. Department of Energy Office of Science
Michigan State University