Isomer API Widget

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Goals

- Create a restful API for users to easily access the LISE^{++} Isomer database and perform filters for desired isomer information.
  - Useful for identifying isomers detected by gamma emissions, visualizing decay schemes, and granting user access to isomer data for research questions.
- Currently, the isomer database can be interfaced, but only one entry at a time.
- The API allows the user to view all isomer information available in the LISE^{++} database at once.
  - Also allows the user to easily download specific filtered data.
    - » Criteria such as half-life, gamma energy, atomic mass and proton number, etc.

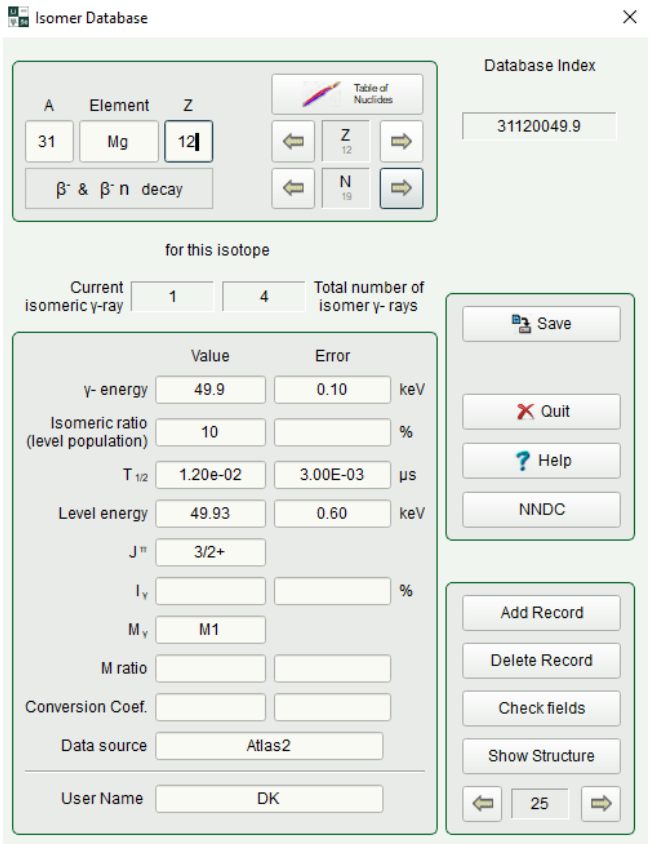

Figure 1: Current Isomer Database view

Methodology

- Use Qt Creator to create a python widget that connects to the LISE^{++} isomer database and presents a view model to the user.
  - QSqlTableModel creates the connection for the widget's table view.
  - The API uses controlled queries with the model that are read-only for bounds on values, integer values, and source names.
- Summary statistics update on model-refresh and provide some context to the user's filters.
- Level scheme drawing utilities can currently be ran on the data when filtered for a particular isotope.
  - Pandas and Sqlite3 create connections to the database based on QSqlTableModel's applied filters.
  - Temporary tables are drawn from the applied filters and passed to a script which creates the drawing.
    - » Other utilities for the database may be implemented later such as source, downloading, etc.

Results

- The Isomer API contains a table view, filter selection, summary statistics, and user operations.
  - Due to batch loading, only 256 entries are loaded in the viewer, however the data contains all entries.
- As development continues, statistics and utilities will continue to grow.
  - A custom isotope filter widget will be included as well as image display formatting for style consistency with LISE^{++}.

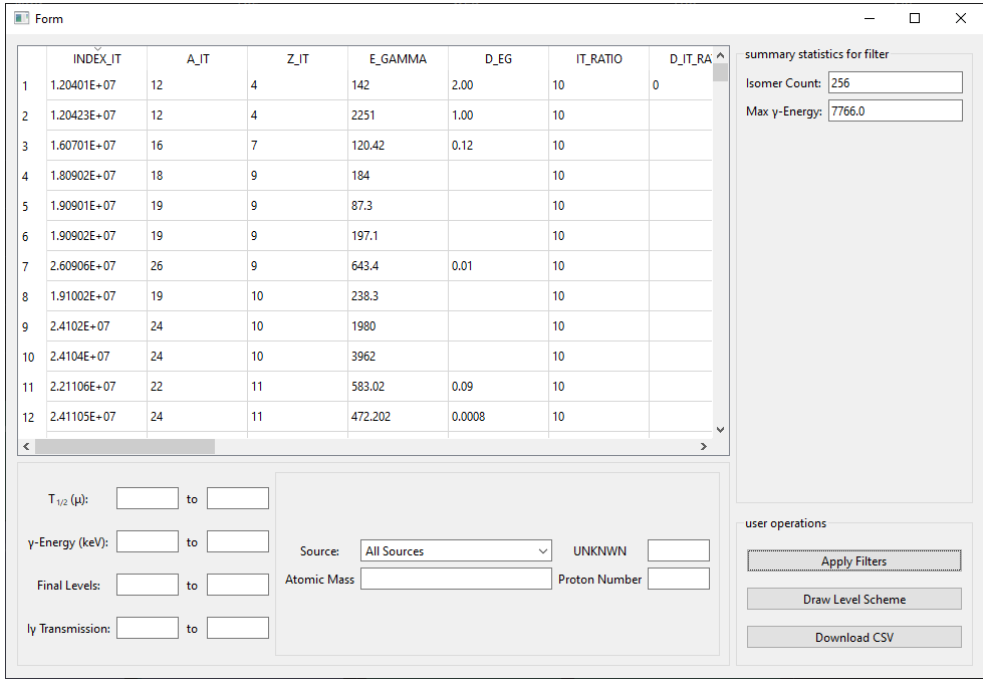

Figure 2: Isomer API before filtering

Example Usage

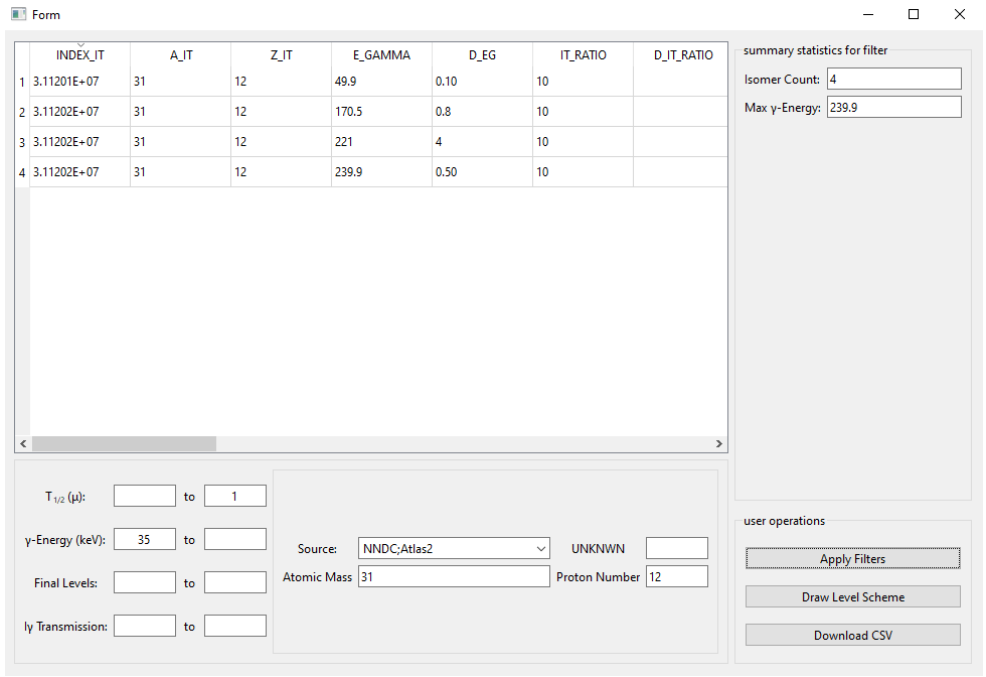

Figure 3: Isomer API before and after filtering on ^{31}Mg (Z=12).

- The database is filtered for ^{31}Mg isomers with half-lives below 1 micro-second and gamma emissions above 35 keV.
- A decay scheme is created based on the entries remaining after the applied filters.

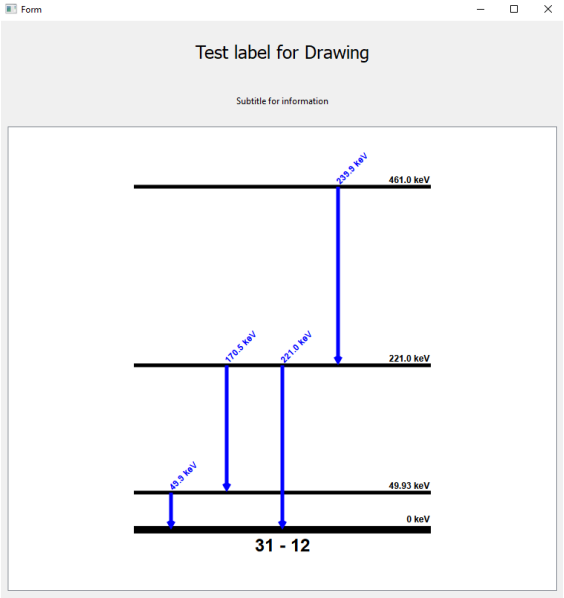

Figure 4: Drawn level-scheme from the filtered data.