IsomerAPI Project Progress Update

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Background

- The Isomer database within LISE^{++} contains large amounts of data for gamma emissions from isomer-state products yielded in experiment.
- Currently, the database is only interfaced in LISE^{++} per emission (Fig. 1) and characterizing decay schemes is difficult.
- The goal has been to develop a restful API for users to easily access the LISE^{++} Isomer database and search for desired isomer information.
  - This is useful for identifying gamma emission sources for PID, visualizing decay schemes and granting user access to Isomer data for research questions
- Initially this application was developed in Python for ease of interfacing the database with packages such as *Pandas* and *sqlite3*.

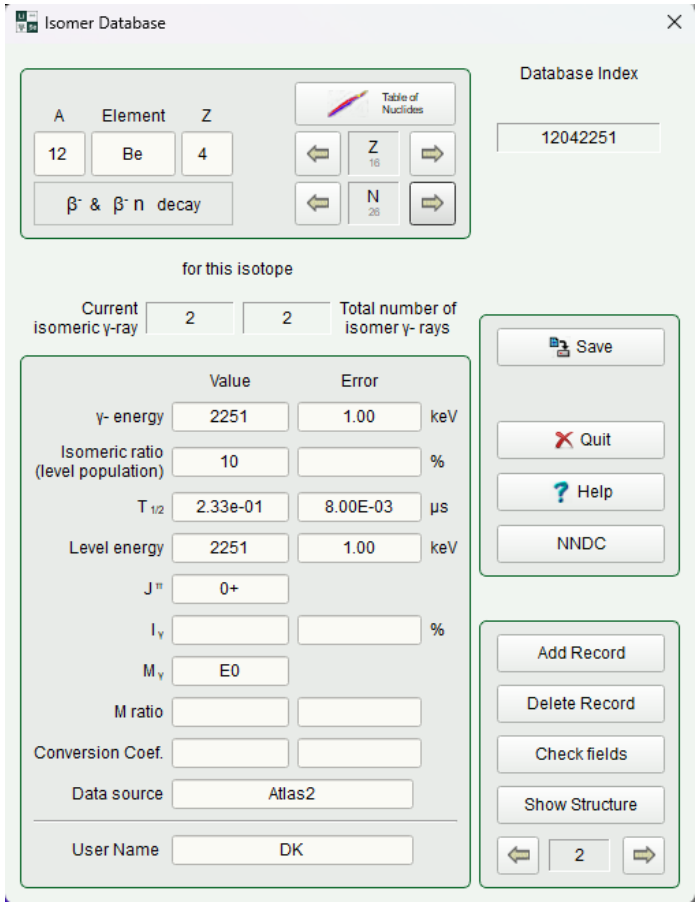

Figure 1: Existing Isomer database interface in LISE^{++}

IsomerAPI Updates

- Since early drafts of the IsomerAPI in Qt for Python (Fig. 2), the application has been manually ported to Qt for C++, the common language of LISE^{++}.
  - Previous limitations included:
    - » Level schemes for only single isotopes, lack of integration with LISE^{++} components, slower data processing

- The new general methodology remains similar:
  - IsomerAPI provides an interface for the SQL database
  - Users may filter data based on Isotope selection, energy ranges, half-lives, etc.
    - » Uses controlled read-only queries internal to the program
  - Level schemes may be drawn with the custom decay scheme program

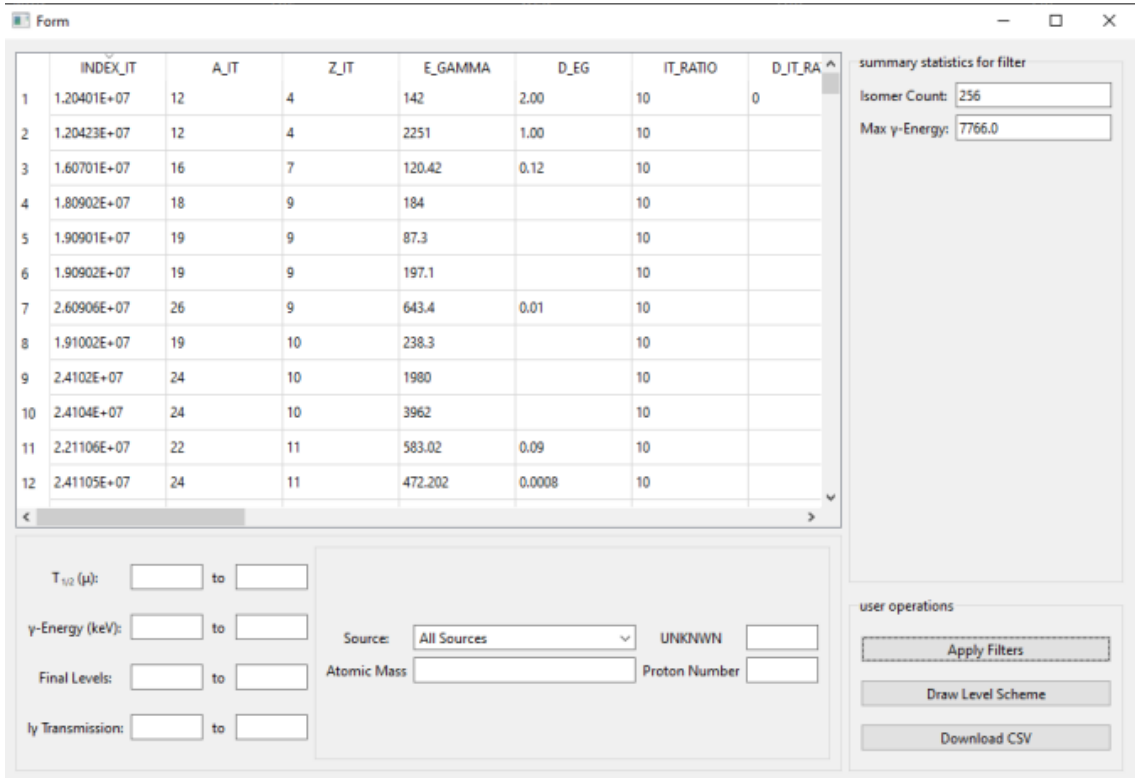

Figure 2: Old Python version of IsomerAPI

IsomerAPI Updates

- The IsomerAPI has gone through major UI updates in the C++ version.
  - Formatting of table view
  - Palette and style consistent with LISE^{++}
  - Improved layout for filtering options
- Internally, the structure of data containers in the application has been completely revamped for later improvements of the application.
  - Moved from vector storage to hash maps for isotope-specific data selection
  - Later allows specific level and transition editing
- Externally, the isomer database is being reorganized into two SQL tables containing levels and transitions separately for better readability and applicability.

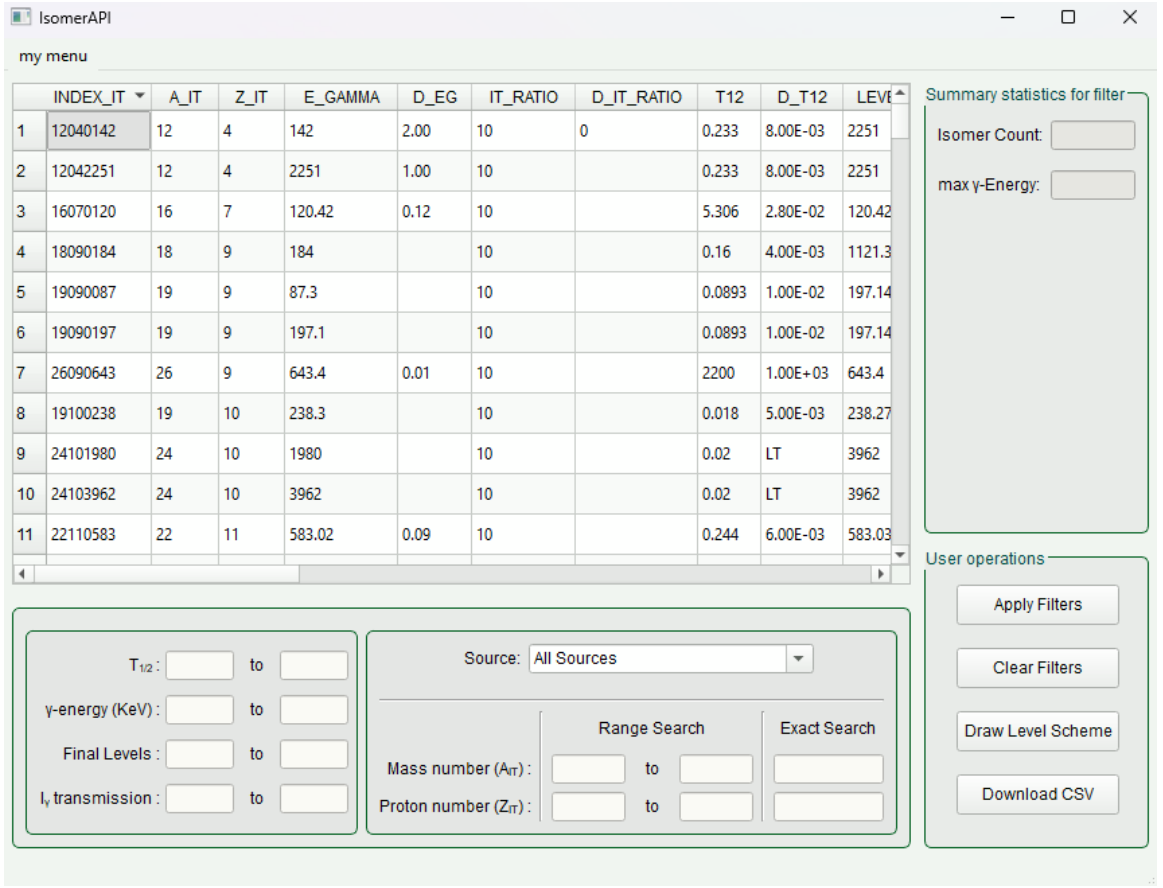

Figure 3: Current C++ version of IsomerAPI

IsomerAPI Updates

- Level scheme creation for multiple isotope searches are now possible (Fig. 5).
  - Unique schemes are created and selectable for each isotope in user's search (Fig. 4)

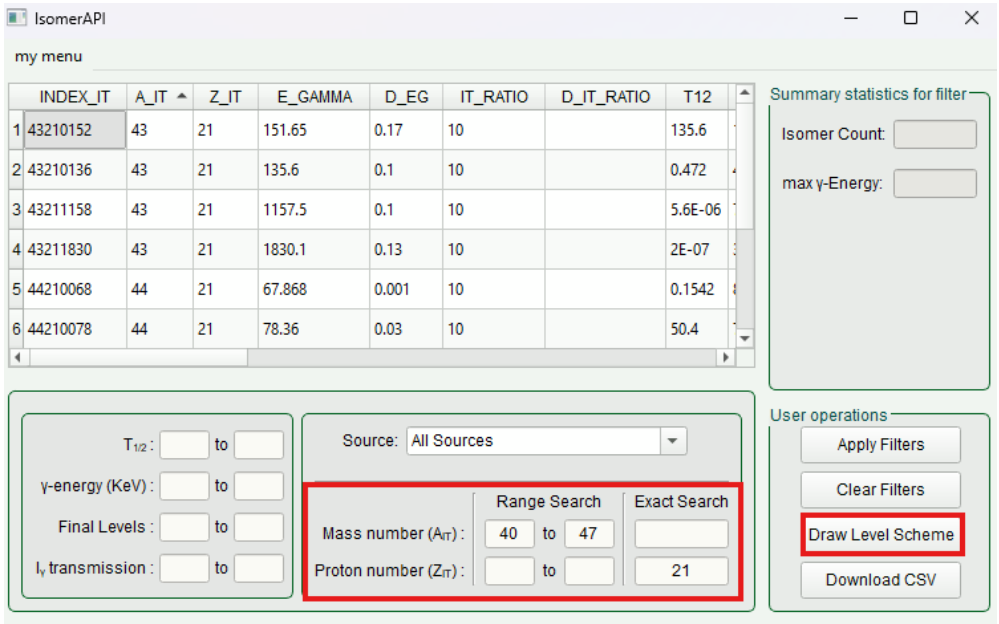

Figure 4: Search for Scandium isotopes with mass between 40 and 47

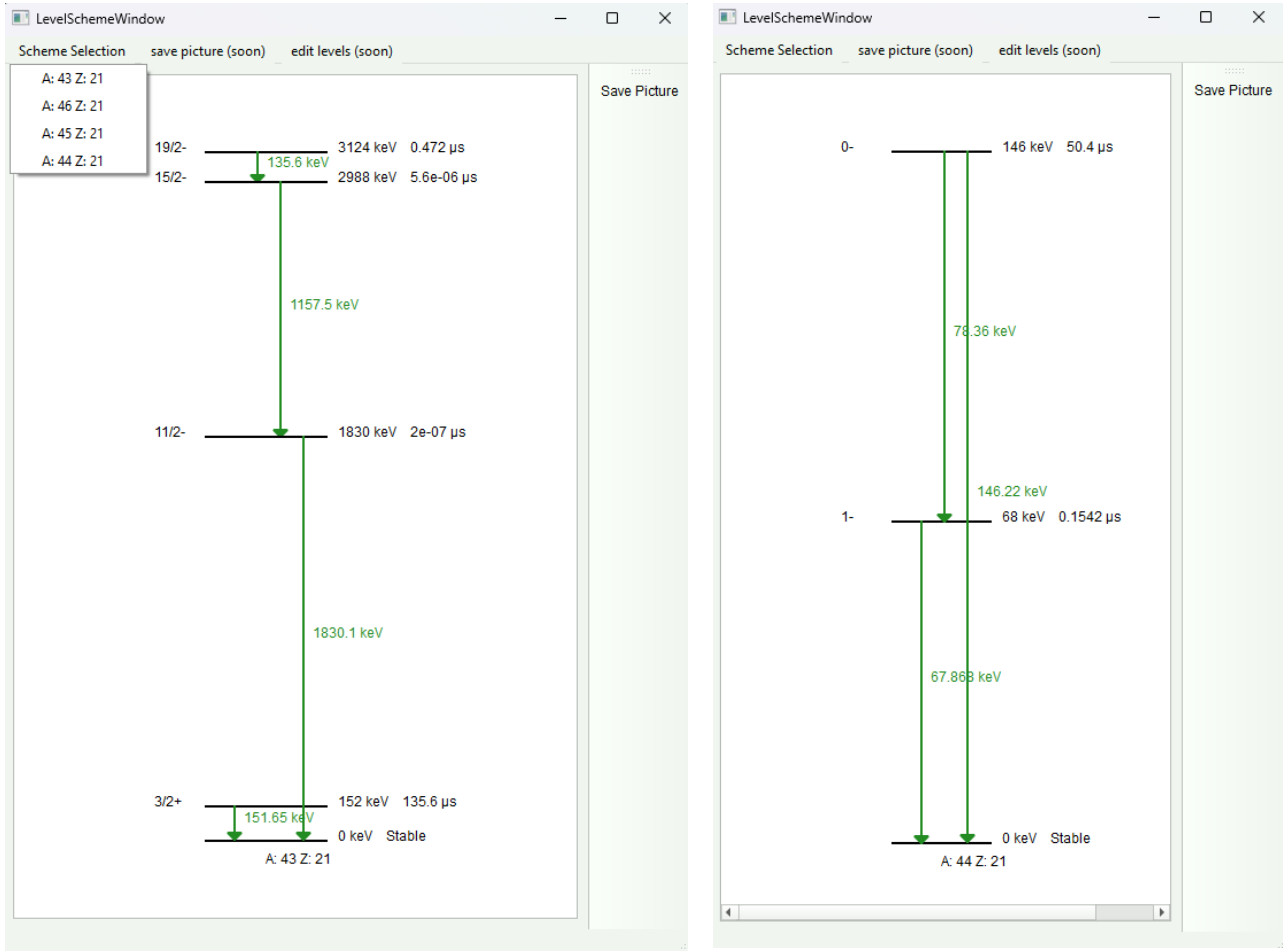

Figure 5: Level schemes for ^{43}Sc (left) and ^{44}Sc (right) with selection dropdown