

Satellite applications and operational improvements

Subject 10 | LISE versions: 18.8.7-11, 18.8.74, 18.8.77-79

These releases improve unattended calculations, saved-file information and bundled-data installation, and record updates to ETACHA, IsomerAPI and GEMINI. They also establish event-local state for future parallel LISE Monte Carlo transport. That foundation retains serial execution; the parallel calculations recorded for GEMINI belong to the separate satellite application.

1 Satellite application updates

The LISE release entries identify the satellite versions bundled in October 2026. The companion reports below expand those entries with operational details, presentation results and later IsomerAPI development through 2.0.1. Their results are attributed to the respective reports; this summary adds no new application benchmark. [3–6]

ETACHA through version 4 9 5

LISE version 18.8.77 | 16 October 2026

ETACHA defaults to the v4 model and accepts fractional beam energies and ultra-thin targets. Higher precision in inputs, displays, logs and batch filenames helps preserve these small or noninteger values throughout the workflow.

The first integration endpoint is limited to the physical target thickness. Integration-step inputs must be positive, and the maximum cannot be below the minimum. These changes improve input handling and numerical boundaries; the cross-section models are unchanged.

Batch operation. Since ETACHA 4.9.2, -r runs without plots unless -p is also supplied. The command ETACHA4.exe ganil.betacha -r -q -v=4 selects model 4 explicitly and closes the application after the five-second completion message; add -p to enable plots. Without -q, the completion message remains open. Saved inputs can restore their model choice, while -v=3 or -v=4 overrides it. [4, pp. 1, 3]

Precision and units. Beam energy accepts 0.001-1000 MeV/u with six decimal places; target thickness accepts values down to 1×10^{-9} mg/cm² with nine decimal places. Integration steps use $\mu\text{g}/\text{cm}^2$, not mg/cm²: a 0.020 mg/cm² foil is 20 $\mu\text{g}/\text{cm}^2$. Scientific notation is accepted, and nonnumeric or nonfinite entries are rejected. The first endpoint is capped at the foil thickness even when the requested minimum step is larger. [4, p. 2]

Batch filenames retain six energy decimals and nine thickness decimals, removing trailing zeros so nearby cases do not overwrite each other under the former one-decimal names. The summary CSV still uses six decimals; thinner values should be checked in the saved input or its basename. The report records completed fractional-energy and ultra-thin-foil checks, plus a $^{238}\text{U}^{35+}$ case at 1.25 MeV/u through 0.020 mg/cm² carbon: mean exit charge 37.022634 and residual energy 1.240670 MeV/u. These are execution checks, not evidence of experimental accuracy or charge-state equilibrium. [4, pp. 2-3]

IsomerAPI through version 2 0 1

LISE version 18.8.78 records 1.4.15 | 16 October 2026; companion report extends through 2.0.1 | 23 October 2026

IsomerAPI improves database-record editing, table filters and counts, half-life units and uncertainty labels in level schemes. The recorded updates also improve interface integration and MinGW/MSVC build and deployment reliability.

Version 1.4.15 removes a duplicate Edit Database Records command, prevents MSVC from compiling matching legacy sources, and refreshes the main window and About dialog. Subsequent work adds the shared core and the selected-level decay repair described below. [3, 5]

Database editing. Options > Edit Database Records supports adding, saving and deleting transition records with validation and SQL transactions. Daughter links must identify an existing level of the same isotope. Shared level attributes remain consistent across gamma rows, and deletion of the last row of a referenced level is blocked. Unsaved edits prompt before navigation or closure; changed results and source choices refresh when the editor closes. [5, p. 3]

Shared transmission interface. Version 2.0.0 extracts IsomerCore, a Qt Core/SQL module without a Widgets or LISE dependency. An explicit A,Z request returns parent levels, gamma transitions, errors and warnings. The standalone Calculate > Isomer Transmission command writes the familiar LVL/GAM text records; LISE consumes the same structured buffer in memory. The managed database connection is reused, while LISE owns its isotope cache. [5, p. 4]

Cascade handling. Default limits are 0.1 μ s for parent selection and 20 μ s for the cascade cutoff. The core reads the full isotope, preserves distinct gamma branches, expands shared daughters once per parent and stops at ground state or a daughter meeting the cutoff. Missing links retain known gamma lines and generate warnings; cycles terminate. Stored intensities and the parent half-life/IT-ratio convention are retained, without a new feeding-kinetics solution or branch normalization. [5, p. 4]

Selected-level plots. Version 2.0.1 loads complete isotope data after choosing the starting level, so table half-life filters no longer remove required daughters from that decay plot. This addresses the ^{78}Zn case involving daughter LEVEL_ID 1562 and GAMMA_ID 4163. Build and deployment updates cover MinGW/MSVC header and source selection, runtime files, and Windows startup behavior. Save As and emissions in coincidence remain marked work in progress. [5, pp. 2-5]

GEMINI through version 3 4 0

LISE version 18.8.79 | 16 October 2026

GEMINI adds parallel compound and fusion execution using thread-local state and random generators. Evaporation-channel selection is made safer for invalid and boundary values. Save and Save As use corrected behavior and result-specific filenames; runtime reporting and scrolling of results and angular distributions are also improved.

Tables and plots. The GEMINI presentation shows PACE-style angular-distribution and center-of-mass spectra tables. Angular tables offer four plot types, including E versus θ , counts versus θ , counts versus energy, and differential cross section versus θ . Plot All opens the selected plot type for all tables; count plots include a Gaussian display. Tables and plots can open in a new window, with separate residual and intermediate-mass-fragment angular-distribution tabs. [6, slides 3-6]

Parallel execution. The interface reads run parameters once, splits events into bounded QtConcurrent worker chunks, and merges their summaries before opening the existing result views. Compound and Fusion modes use the same pattern. CNucleus products, caches, evaporation helpers, yrast state and random generators become thread-local; runtime appears in the output window. The same cascade calculations and output categories are retained. [6, slides 7-9]

Performance and physics scope. Arjun Ray's presentation reports about 1.6 $\times$ speedup from initial optimization and approximately 6 $\times$ average speedup from parallelization across its Fusion and Compound tests. These are separate reported comparisons, not factors to multiply or a guaranteed speedup for every run. Width, barrier, mass, level-density and evaporation formulas were not replaced; invalid cumulative-distribution lookups are guarded. Event order changes, so exact replay of the serial random sequence is not expected. [6, slides 2, 9-10]

Validation status. The historical LISE entries for 18.8.77-79 record that compilation was not performed for those entries. The later companion sources add the ETACHA execution checks and GEMINI timing comparisons summarized above; the IsomerAPI report also lists checks to perform for the next release. Those planned checks are not reported here as completed tests. GEMINI parallelization remains distinct from the serial LISE Monte Carlo foundation in Section 4. [3-6]

2 Silent batch controls and diagnostic logging

Optional clearing after input loading

LISE version 18.8.7 | 12 September 2026 | Source [1]

The `-clear` command-line key, also accepted as `/clear`, lets a silent calculation discard isotope calculation arrays restored from the input file. With silent mode and this key enabled, `clear_iso()` runs immediately after loading the LISE file, before isotope-list handling and transmission calculation.

A silent run without `-clear` retains the restored arrays. The clearing operation is therefore an explicit batch choice. Its completion is written to the optional silent batch log.

Suppressed messages in the batch log

LISE version 18.8.11 | 14 September 2026 | Source [2]

When `-log` opens a silent batch log, `QoMessageBox` receives its active `QTextStream` and writes suppressed messages with their kind, title and text. Each entry is flushed, and existing debug output is retained. The stream pointer is cleared when silent processing ends.

The secondary-reaction link warning is routed through `QoMessageBox`. In silent mode it produces neither a dialog nor a warning sound; the recorded trigger is more than 1.1 million links. Silent wrappers return their configured default button. Interactive operation continues to use standard message boxes.

Operational implication. Use an open `-log` stream when diagnostics from unattended runs must be retained. Silent mode alone does not create a log. Source review checked the clear ordering and message route; the supplied reports record no end-to-end batch test for these changes. [1, 2]

3 Readable information in saved LISE files

Wedge geometry

LISE version 18.8.9 | 12 September 2026 | Source [2]

Wedge entries in the readable Info Part include material, effective thickness, a profile-labelled angle and position shift. Thickness and angle use two decimal places; angle remains in mrad, and shift is written to one decimal place in mm. A semicolon separates thickness from angle. Production-target entries retain `Reactions=On`, and wedges with positive thickness are reported.

The shift comes from `getShift()`. This is a reporting improvement: it does not change wedge transport geometry or internal numerical precision.

Fragment of interest

LISE version 18.8.10 | 13 September 2026 | Source [2]

The fragment-of-interest summary uses a charge-and-reaction lookup for direct production rate and transmission without secondary reactions, and a separate simple-isotope lookup for summed reaction rate and the availability of overall transmission. Missing entries produce zero for the affected value.

Rates remain in pps; transmission is labelled noSR or Overall, with noSR converted to percent. The correction selects the appropriate stored quantities and introduces no new reaction model. Representative saved-file comparisons remain a useful release check.

4 Monte Carlo state foundation

LISE version 18.8.8 | 12 September 2026 | Source [2]

Each MC_Trans_Base instance owns an MC_EventContext containing the mutable state of one transported history. It groups energy, flight time, path length, longitudinal endpoints, position, velocity, charge, energy loss, deposition, range, bunch resolution, reaction position and the last working block. Event.Reset() clears this state at the beginning of a history.

Compatibility references preserve existing names such as Ecurr, CurrentQ and v3_position. The random generator uses thread-local Park-Miller state and an explicit SeedRandom entry point. Initialization mixes time, process ID and an atomic sequence, while Monte Carlo isotope selection uses MyRandom instead of rand.

Execution limit. LISE Monte Carlo transport remains serial. Shared block transport data, counters, GUI updates and result merging still require isolation or coordination before arbitrary concurrent histories can run safely. This release establishes neither a parallel speedup nor equality between serial and parallel results. [2]

5 Bundled spectra installation

LISE version 18.8.74 | 16 October 2026 | Source [3]

My Documents initialization creates the parent directory of every configured destination before copying files. Bundled spectra under spectra/1d and spectra/2d can therefore be installed instead of failing silently when their destination subdirectories do not exist.

The copy list includes plotMC.spa. The version increment triggers the initialization copy pass for existing installations. The release entry records that this change was not compiled; it does not supply an installation benchmark.

6 Version and source references

The subject covers nine LISE versions: 18.8.7-11, 18.8.74, 18.8.77-79. Versions 18.8.7 and 18.8.11 cover silent operation; 18.8.8 covers Monte Carlo state; 18.8.9-10 cover saved-file information; 18.8.74 covers installation; and 18.8.77-79 record the three satellite updates. The satellite discussion is supplemented by the three linked reports below, including IsomerAPI developments later than the original 18.8.78 entry. Keep these PDFs beside this document for the relative links to resolve.

[1] [LISE_versions_18.8.1_to_18.8.7.docx](#), supplied report, section Version 18.8.7. Original location: S:/_LISEcute/Versions/18/18.09/.

[2] [LISE_versions_18.8.8_to_18.8.13.docx](#), supplied report, sections Version 18.8.8 through Version 18.8.11. Original location: S:/_LISEcute/Versions/18/18.09/.

[3] LISE revision history, L_Init/lise_version.h, entries 18.8.74 and 18.8.77-79. These later entries supplement the two supplied September reports.

[4] [ETACHA release update, versions 4.9.2-4.9.5](#) Prepared 24 October 2026; pp. 1-3 cover batch controls, precision, integration endpoints and verification.

[5] [IsomerAPI development update through 2.0.1](#) Documentation dated 24 October 2026; pp. 2-5 cover editing, plotting, IsomerCore and maintenance.

[6] [GEMINI updates v3.4, Arjun Ray](#) Workshop presentation; slides 2-10 cover optimization, tables and plots, parallel execution and reported timing results.

Implementation references identified in the supplied reports: w_Main/main_start.h; w_Main/main.cpp; w_Main/MainWindow_file.cpp; w_Main/MainWindow.cpp; w_Main/MainWindow_calcTrans.cpp; w_Stuff/w_QoMessageBox.h and .cpp; c_Config/c_ConfigPP_write.cpp; d_MC/o_MC_transBase.h; d_MC/o_MC_trans.cpp; d_MC/d_MC_plot.cpp; w_Stuff/win_utilCalc.cpp; doc/MC_parallelization.md.