

ETACHA Release Update Details

Versions 4.9.2 through 4.9.5

Prepared 24 October 2026 | Latest release 16 October 2026

These releases refine automated batch runs, select ETACHA 4 as the startup model, and preserve the precision needed for thin carbon strippers and fractional beam energies. The thin-target work addresses GANIL inputs such as 0.020–0.5 mg/cm² carbon foils and uranium beams between 1 and 1.5 MeV/u.

Version	Release date	Main change
4.9.2	22 Aug 2026	Plots in command-line batch mode require -p.
4.9.3	15 Oct 2026	ETACHA 4 becomes the startup model default.
4.9.4	16 Oct 2026	Fine input precision and a corrected first integration endpoint for ultra-thin targets.
4.9.5	16 Oct 2026	Version increment and expanded update details for the GANIL changes.

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When -r starts a calculation from the command line, plots are disabled unless -p is also supplied. This lets automated runs proceed without opening plot windows. The rule is applied after input files and command-line model options are loaded.

```
ETACHA4.exe scan.betacha -r -q
ETACHA4.exe scan.betacha -r -p -q
```

The first command runs without plots; the second enables plots. The existing -q option closes the completion message after five seconds and then closes the application. Without -q, the batch completion message remains open. Slash-prefixed options such as /r and /p are also accepted.

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The startup model default changes from ETACHA 3 to ETACHA 4. A saved input file can still restore its stored model selection, and an explicit command-line option such as -v=3 or -v=4 overrides the loaded selection. Users comparing older calculations should set the model explicitly.

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Version 4.9.4 implements the input and integration changes. Version 4.9.5 records the detailed behavior, examples, and verification cases and increments the application release. The cross-section models are unchanged by this update.

Input precision and units

Input	Accepted values and precision	Example
Beam energy	0.001–1000 MeV/u; six decimal places retained when the page is populated.	1.25 MeV/u
Target thickness	Minimum 1×10^{-9} mg/cm ² ; nine decimal places retained.	0.020 mg/cm ²
Minimum and maximum steps	Positive values in $\mu\text{g}/\text{cm}^2$; nine decimal places retained. Maximum must be at least the minimum.	5 and 2000 $\mu\text{g}/\text{cm}^2$

The energy and thickness fields use a decimal point and accept scientific notation. Non-numeric and non-finite values are rejected. The update preserves small values when input files or batch cases are loaded.

Target thickness is entered in mg/cm², while integration steps use $\mu\text{g}/\text{cm}^2$. Thus 0.020 mg/cm² equals 20 $\mu\text{g}/\text{cm}^2$. Fractional energy entry does not require a 1 MeV/u increment.

First integration endpoint

Previously, the first requested integration endpoint was the configured minimum step, even when that step exceeded the entire target thickness. The solver could therefore integrate beyond an ultra-thin foil before the target-end check was reached.

The update converts the target thickness to $\mu\text{g}/\text{cm}^2$ and caps the output-step controls and first endpoint at that thickness. For a 0.000001 mg/cm² target, the physical endpoint is 0.001 $\mu\text{g}/\text{cm}^2$ even if the minimum-step field contains 5 $\mu\text{g}/\text{cm}^2$.

Displays and batch output names

The main page retains six energy decimals and nine thickness decimals. Final-energy displays and energy log headings use six decimal places, and the cross-section results caption shows fractional energy more clearly. Main and shell thickness progress messages use six decimal places in mg/cm².

Batch input and result basenames now retain six energy and nine thickness decimal places, with trailing zeros removed. The former one-decimal naming scheme could assign the same name to different thin-foil or closely spaced energy cases, allowing later output to overwrite earlier output.

```
238U35_e1.25_12C_t0.02.etacha  
238U35_e1.25_12C_t0.025.etacha
```

The summary CSV still uses six decimals. For thinner values, check the saved .etacha input or its basename.

Examples and verification

A batch data row contains projectile mass, atomic number, charge state and energy, followed by target mass, atomic number, thickness and density. Energy is in MeV/u, thickness in mg/cm², and density in g/cm³. For uranium-238 at charge 35+ through carbon:

```
! Ab  Zb  Qb  Eb      At  Zt  Thick  Density
238  92  35  1.25   12   6   0.020  2.25
```

Run this input with an explicit model selection when reproducibility across releases matters:

```
ETACHA4.exe ganil.betacha -r -q -v=4
ETACHA4.exe ganil.betacha -r -p -q -v=4
```

Use the decimal point shown above. For interactive work, enter 1.25 in the initial energy field and 0.020 in the target thickness field. Integration-step entries remain in µg/cm².

Completed verification cases

Case	Inputs	Observed result
Fractional energies	Carbon beam at 1.00, 1.25 and 1.50 MeV/u through 0.020 mg/cm ² carbon.	All three calculations produced complete output with distinct energy names.
Ultra-thin target	Carbon beam at 1.25 MeV/u; 0.000001 mg/cm ² carbon; minimum step 5 µg/cm ² .	Calculation completed with the target value retained and the first endpoint capped at the foil thickness.
GANIL uranium case	²³⁸ U ³⁵⁺ at 1.25 MeV/u through 0.020 mg/cm ² carbon.	Calculation completed; mean exit charge 37.022634 and residual energy 1.240670 MeV/u.

These checks establish that the updated input and numerical paths execute for the stated cases. They do not establish experimental accuracy or equilibrium for a particular foil. The existing model-validity warning remains available.

Release identifiers and implementation references

The application identifies itself as Version 4.9.5 dated 16-OCT-2026. Windows file and product versions are 4.9.5.1; the non-Windows project version is 4.9.5.

Project references: ETACHA4.pro defines build versions; g_Etacha4/win/e_ftype.h records release history; e_main.cpp and e_mainwindow.cpp implement command-line plotting, model defaults, input precision and batch naming; g_Etacha4/source/e_Etacha4.cpp caps the integration endpoint; e_Etacha4_print.cpp and win/e_CSresults.cpp update energy formatting.