CalcHEP Developments

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What vertices are possible?

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Maximum of 4 particles.

No 4-fermion vertices
(unless split with auxiliary field).

What vertices are possible?

Any Lorentz structure you can build with:

pi	Momentum of ith particle.
mi , Mi	1st , 2nd Lorentz index of ith particle.
eps(v1,v2,v3,v4)	Levi-Civita epsilon tensor.
G(5) , G(v)	Dirac gamma matrices.

Why Feynman Gauge?

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Symbolic algebra
is also faster in
Feynman gauge.

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But, need ghosts and Goldstones
in external states
to cancel unphysical polarizations.

New Developments

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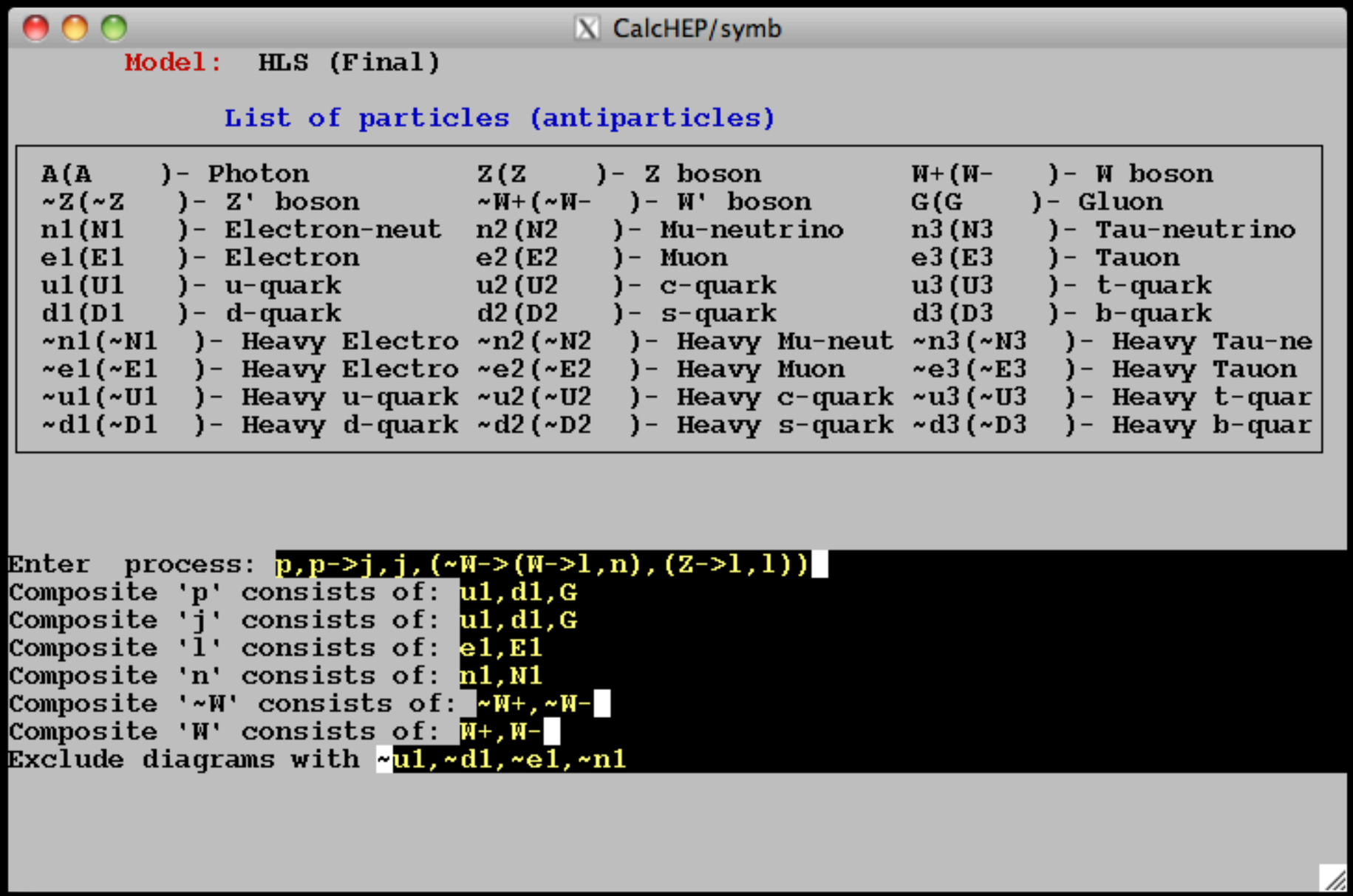
Choose resonant diagrams:

$$p, p \to j, j, (\sim W \to (W \to l, n), (Z \to l, l))$$

New Developments



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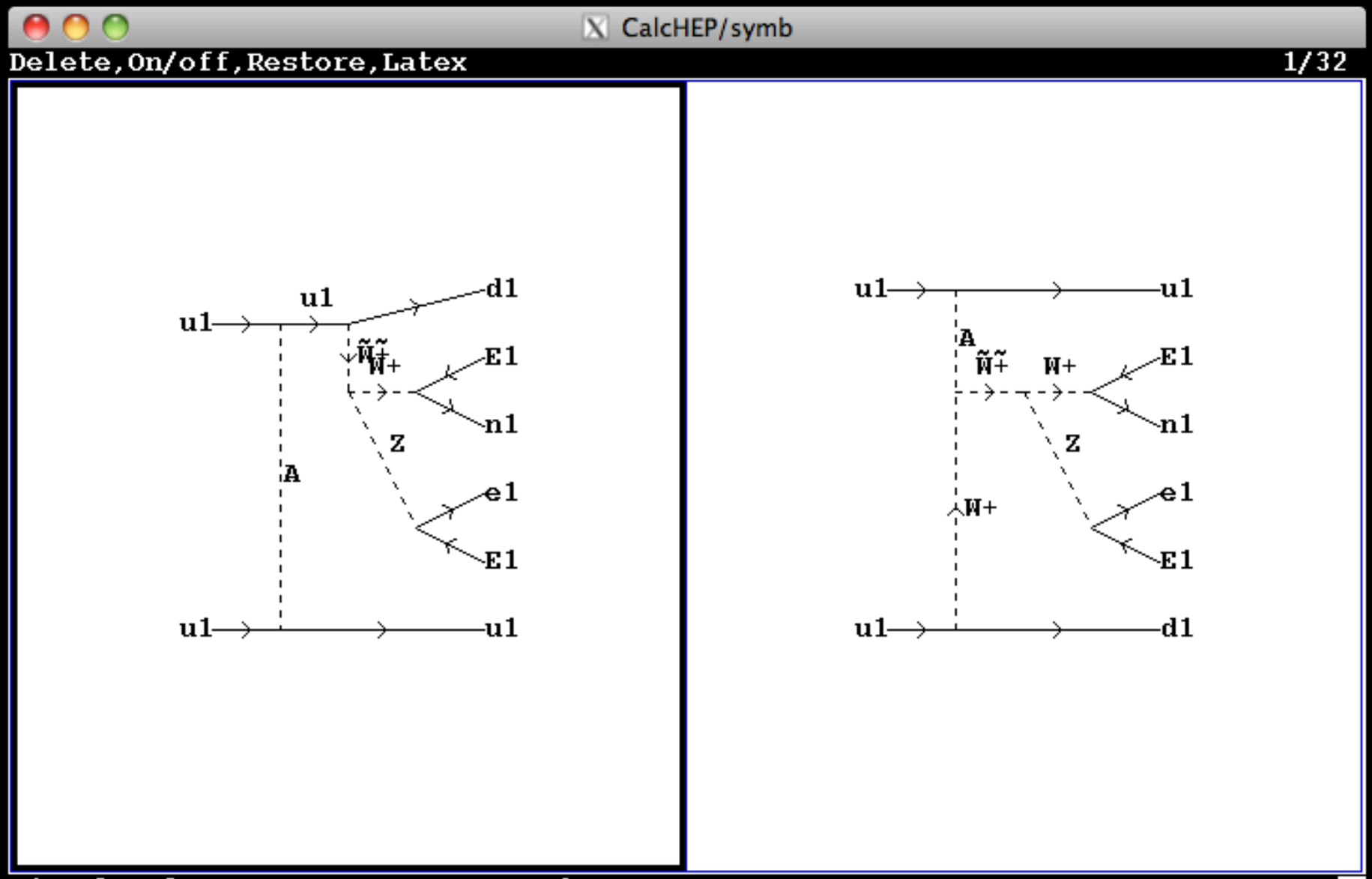

New Developments

New numerical session:

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Allows general definition of “composites”.

New Developments

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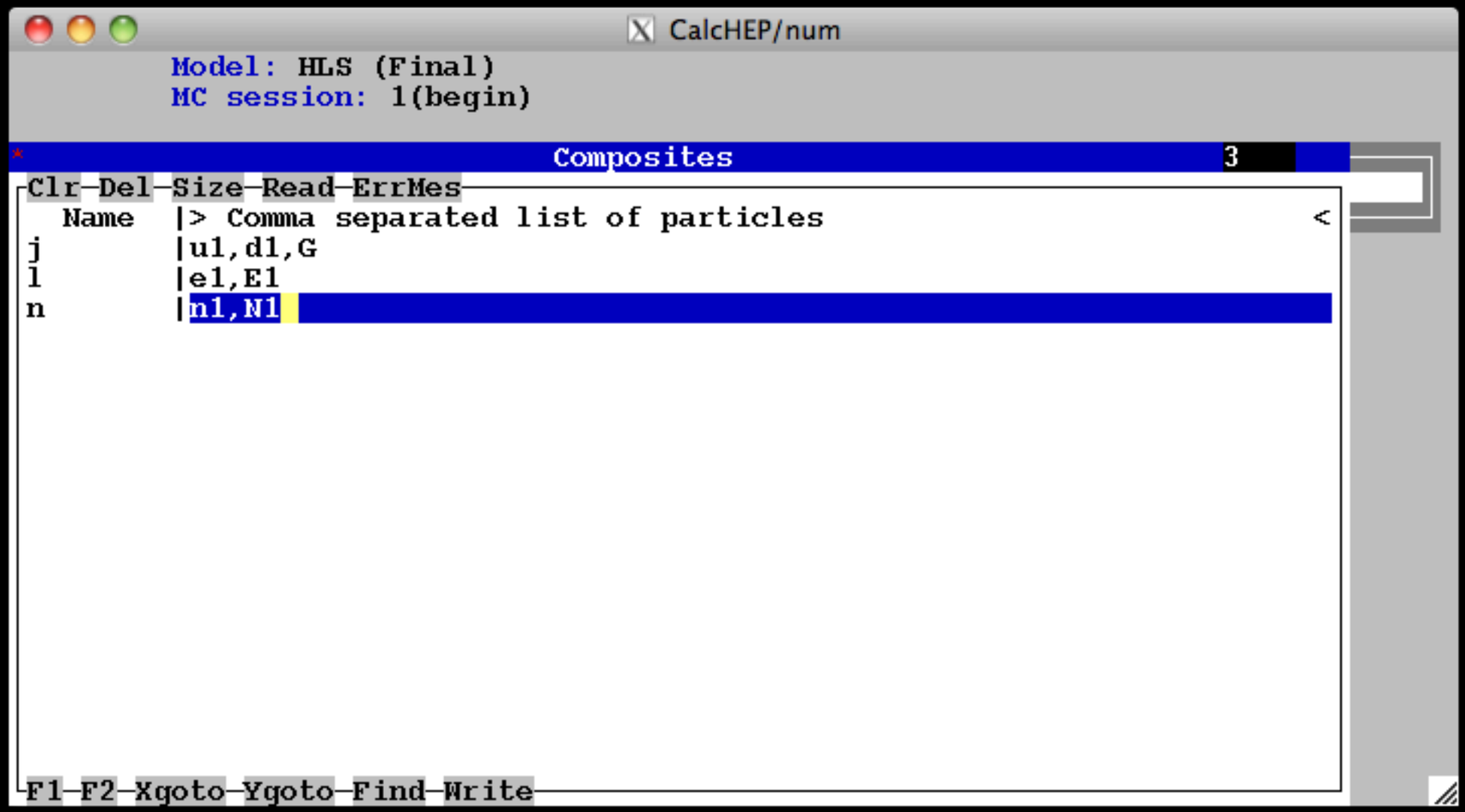

New Developments

New numerical session:

Allows to dynamically generate multiple production and decay processes.

New Developments

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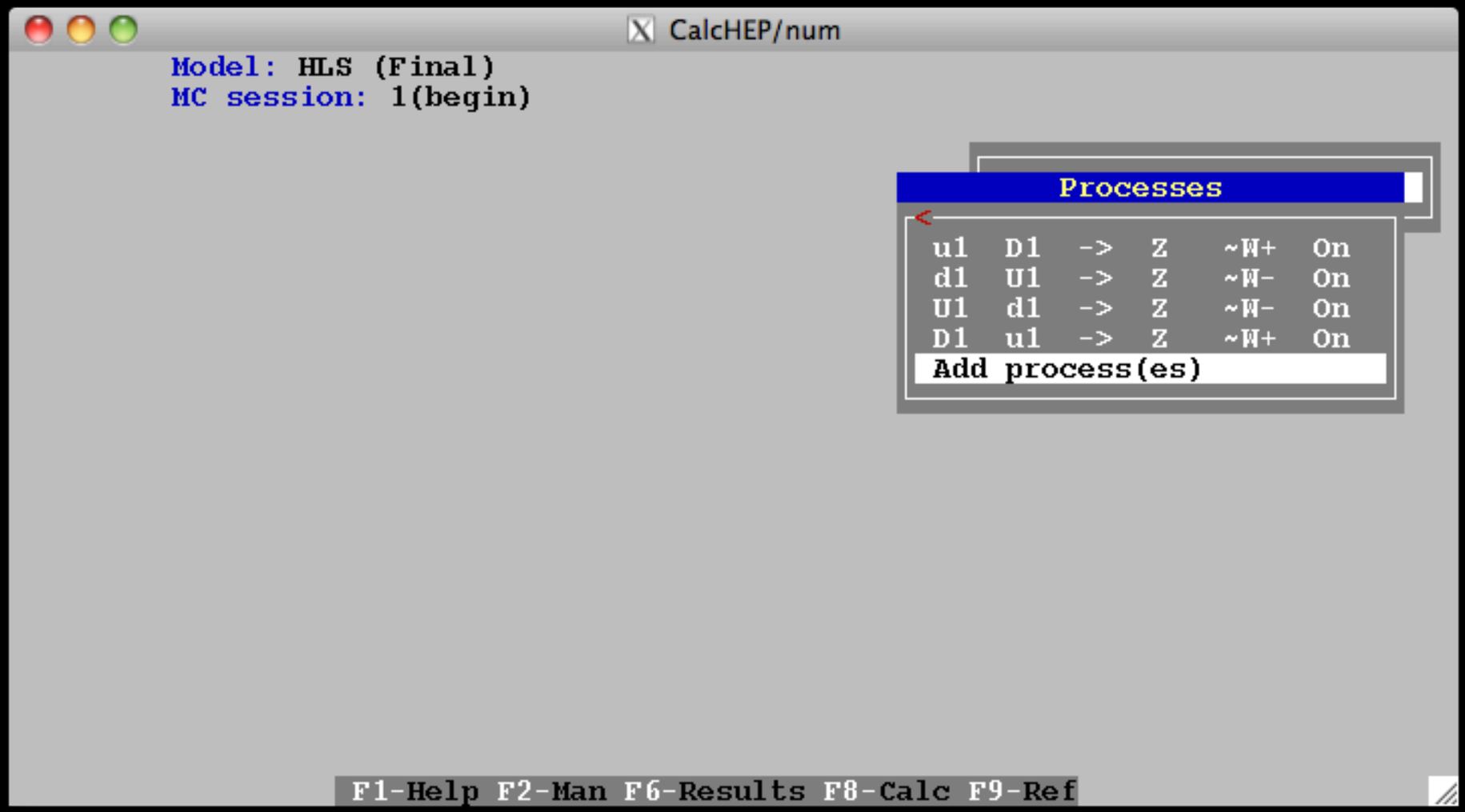

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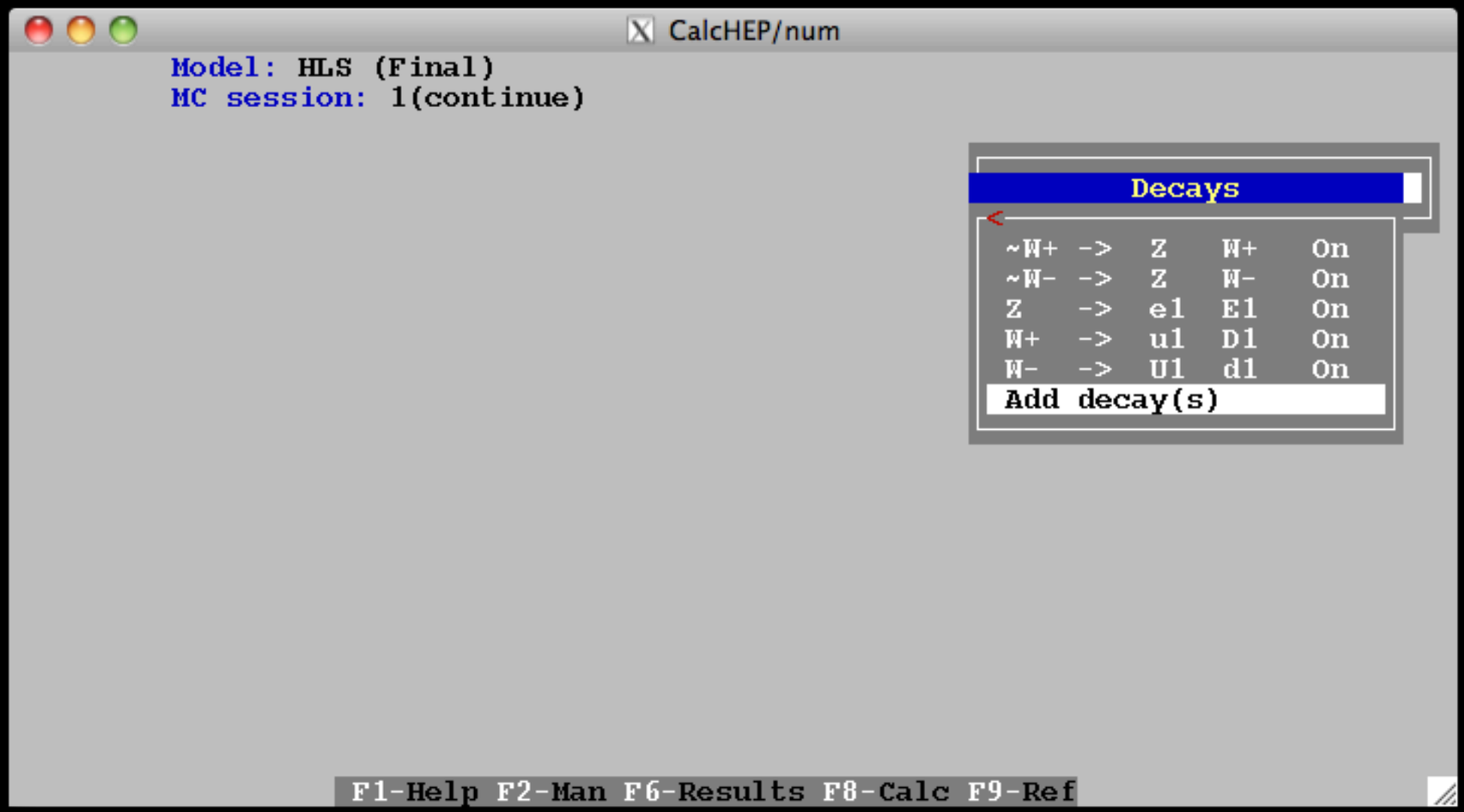

New Developments

New numerical session:

Allows to cut on final states (after decay).

New Developments

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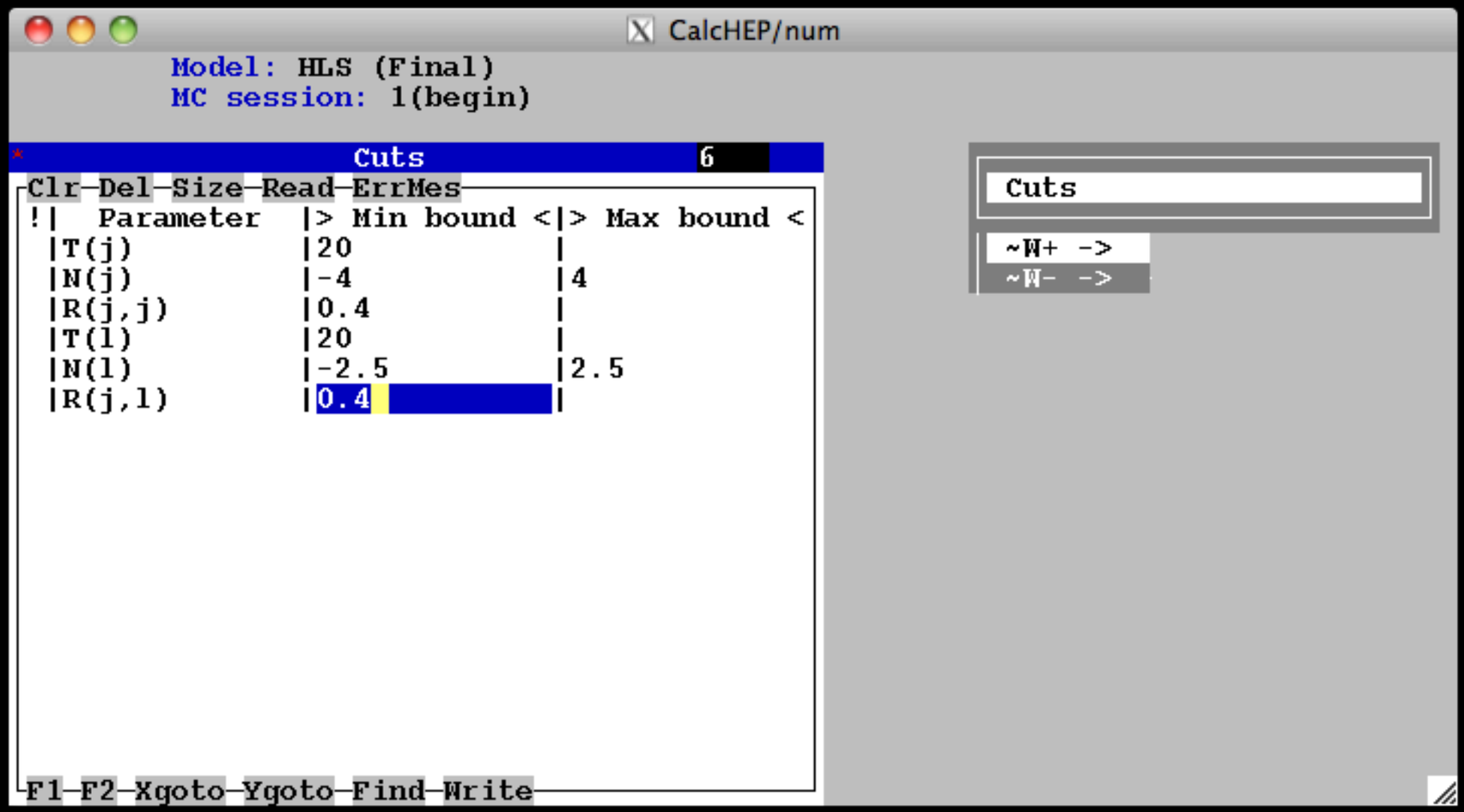

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Allows to bin final states (after decay).

New Developments

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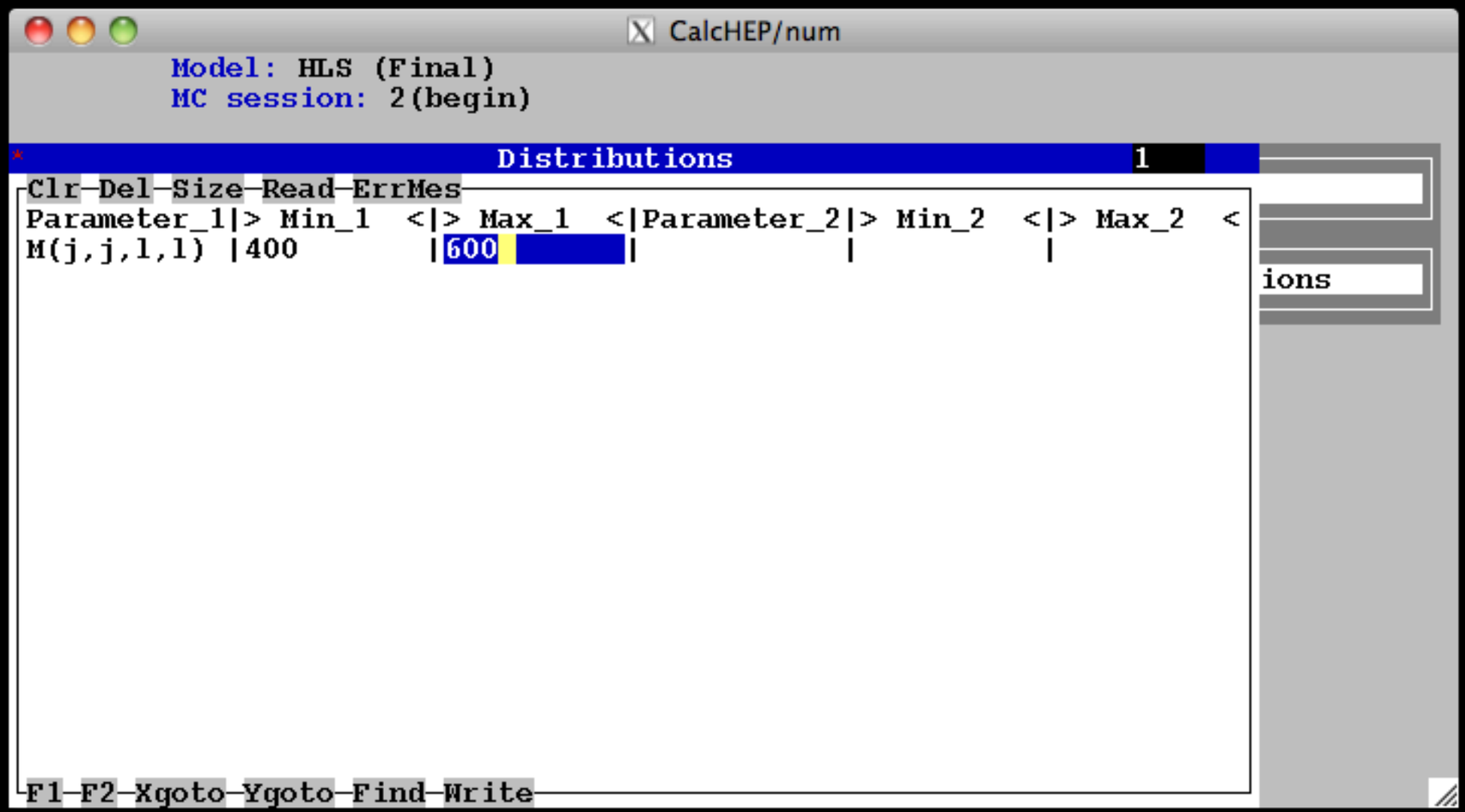

New Developments

New numerical session:

Improves all the grids.

New Developments

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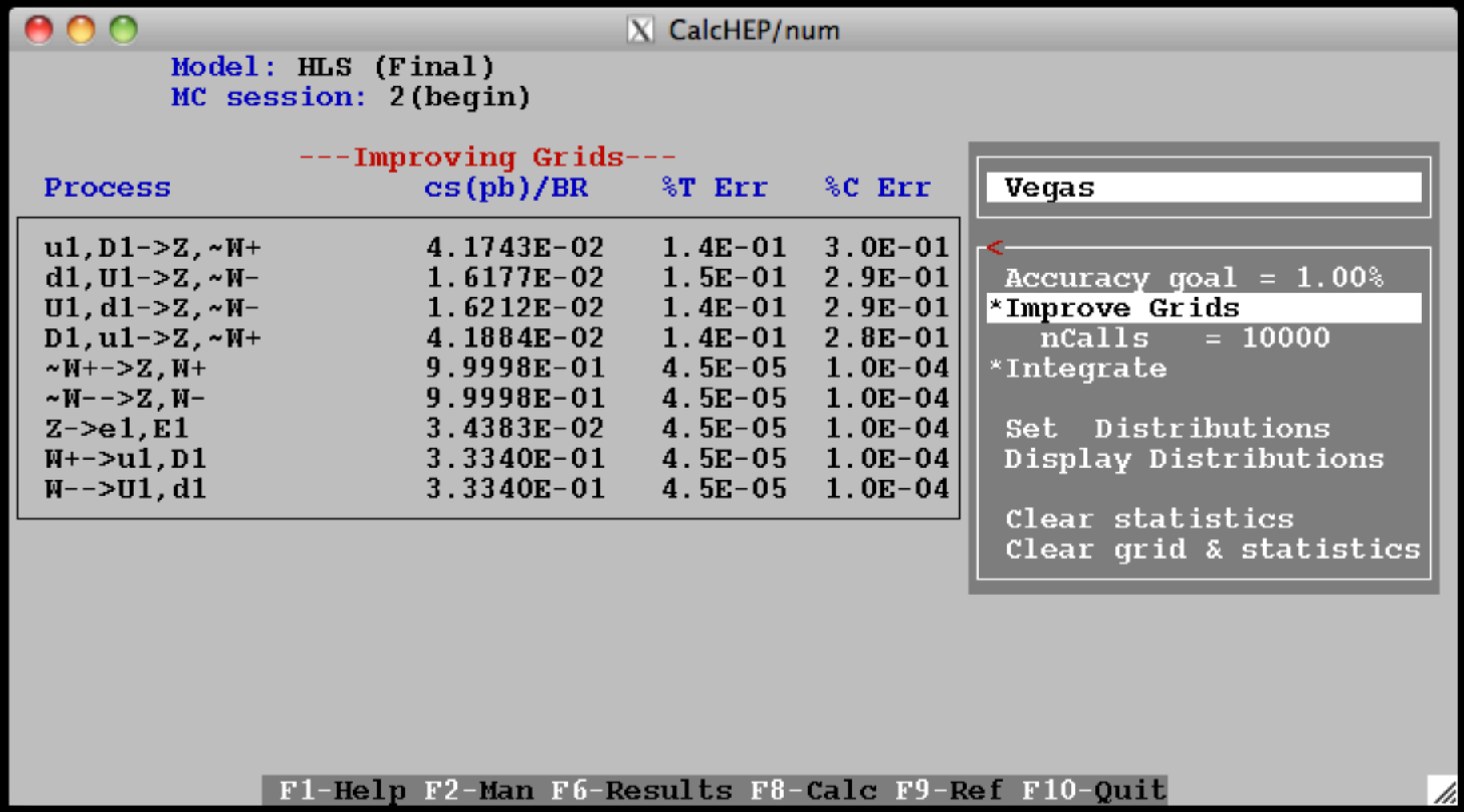

New Developments

New numerical session:

Dynamically connects production and decays.
Sums over subprocesses.

New Developments

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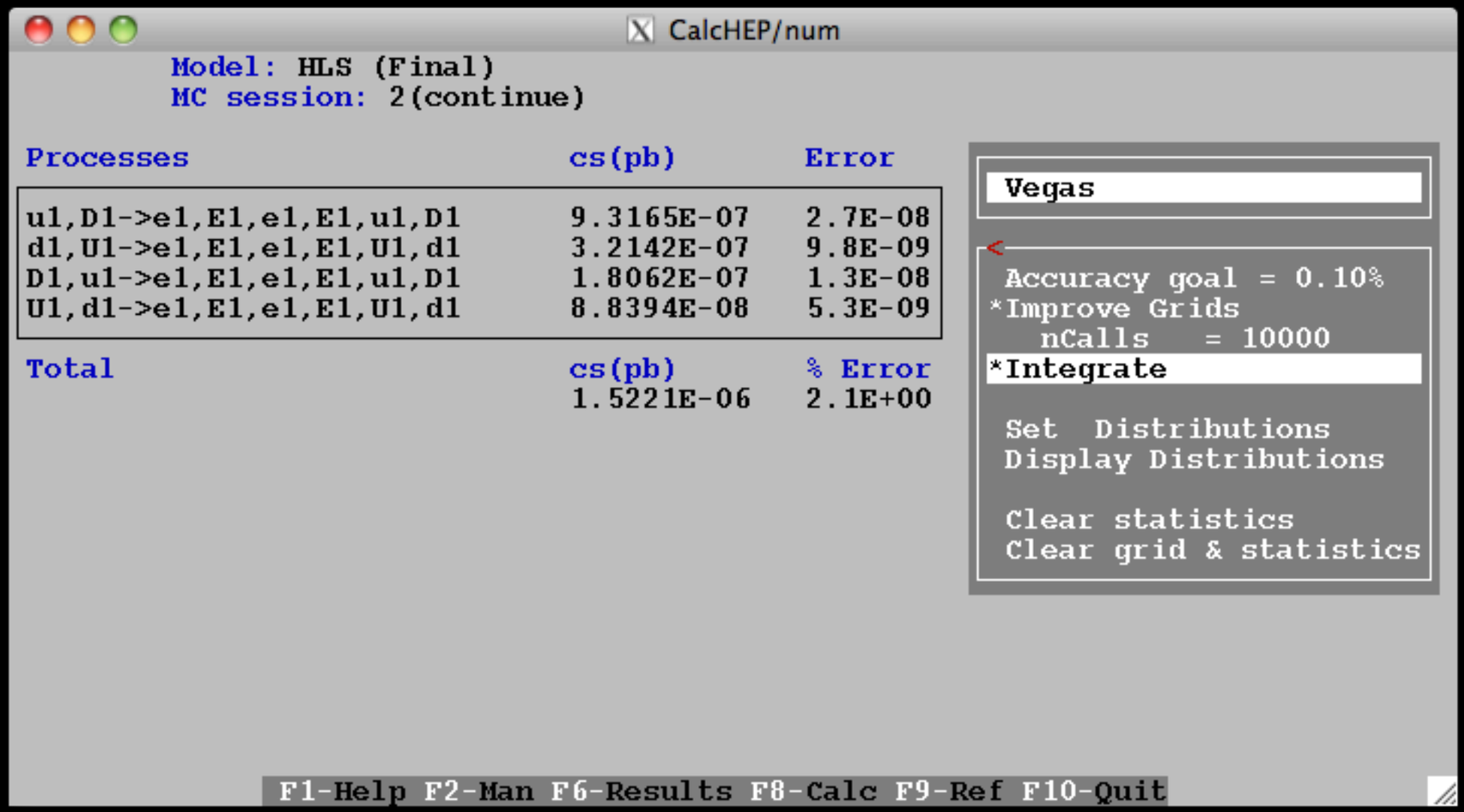


New Developments

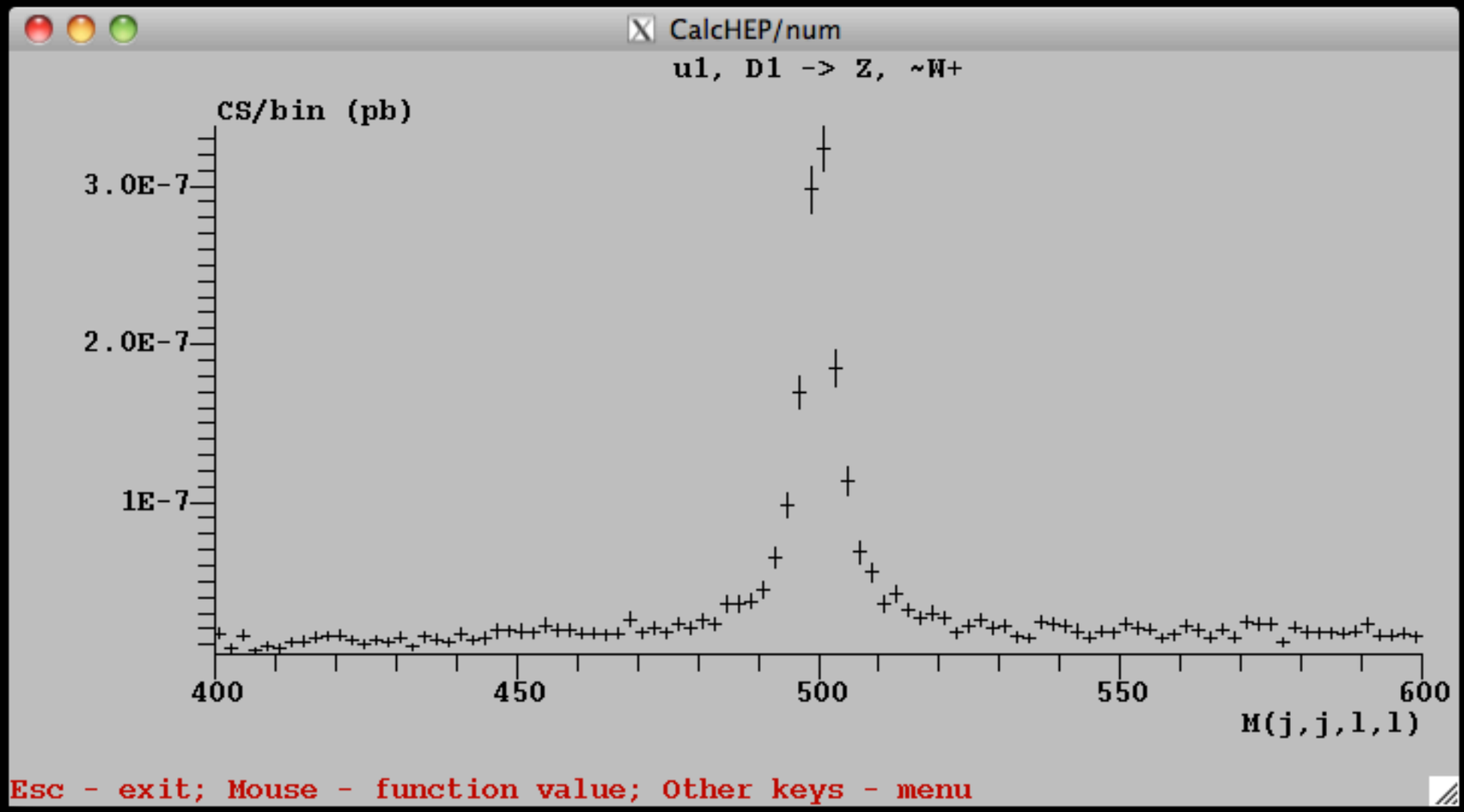
New numerical session:

Cuts final states (after decay).

Bins final states (after decay).

New Developments

New numerical session:



New Developments

New numerical session:

Spends increasingly more time on subprocesses with largest absolute error.

New Developments

New numerical session:

Future : Write events (after decay).

CH Wish List
for FeynRules

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for FeynRules

I am already very happy with it.

CH Wish List
for FeynRules

Stability:

Automated validations run for each stable version and subversion.

Think about how to improve the code that is present as well as tack on new modules.

CH Wish List
for FeynRules

Complex Parameters:

CH only allows real parameters.

Perhaps a general routine which splits complex parameters into real and imaginary parts? (Christian?)

CH Wish List
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4 Color Adjoint Vertices:

In CH, this must be done via auxiliary fields.

Can this be automated?

Sasha's Wish List
for FeynRules

Template for batch mode.

Example how to run in batch mode.

My Wish List
for FeynRules

More Warnings:

Lots of questions from users where they do something wrong in FR. Can we think about more detailed warnings?

E.g. Definitions->{phi -> (v+h)/Sqrt[2]}
is not allowed.

My Wish List
for FeynRules

Easier Model Implementation:

Although much easier,
implementing a new model is still coding.
Let's bring it to the "masses".

Java interface? (Started...)

My Wish List
for FeynRules

FeynRules 2011

Possibly emphasize physics goals which requires technology rather than emphasizing technology?

E.g. Working Group 1 : Implement model Y including spin 3/2 particle X (which is currently impossible for FeynRules) and study the LHC phenomenology, finishing with a paper.