Review of some recent developments (v.9.4)

This document

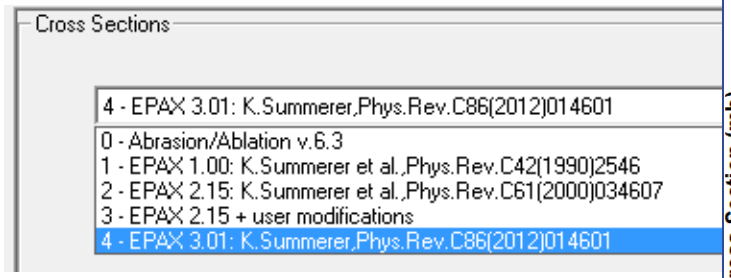
- EPAX 3 implementation
- Update of the internal database based on AME &NUBASE 2012
- Probability for compound nucleus formation
- LISE^{++} site address and download link
- Update of Transmission calculations
- Fixed bugs
- Site statistics (2012)

External links

- Abrasion-Ablation update, Plot of initial prefragments
- NSCL and FRIB rate plots
- New Database Plots, Database features, Plot options
- New block "RF-buncher", RESOLUT separator configuration
- Acculinna2 extended configuration
- NRV (Low Energy Nuclear Knowledge Base) : LISE^{++} `s partner site
- Asymmetry of momentum distributions (projectile fragmentation)
- Modifications table: sorting by application

EPAX 3

EPAX 3 set by default in the version 9.5

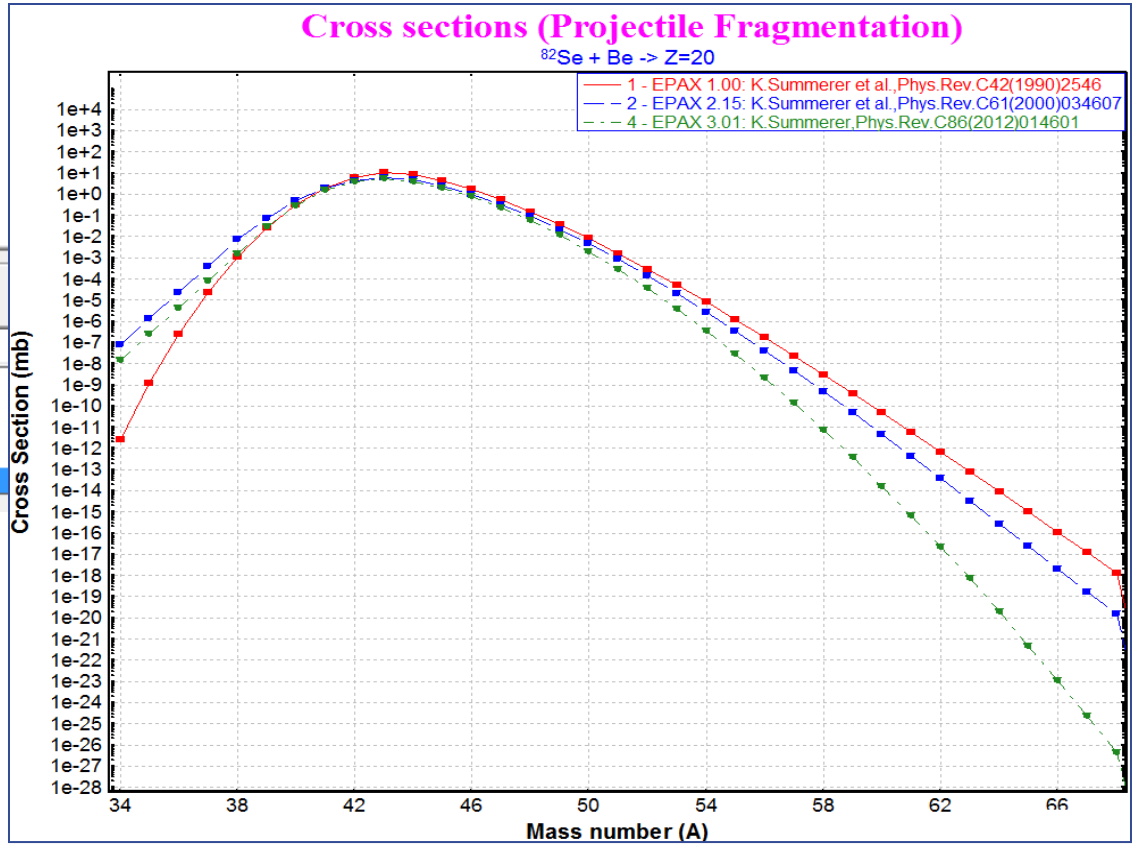


PHYSICAL REVIEW C **86**, 014601 (2012)

Improved empirical parametrization of fragmentation cross sections

K. Sümmerer
GSI Helmholtzzentrum für Schwerionenforschung, Planckstr.1, D-64291 Darmstadt, Germany
(Received 25 May 2012; published 2 July 2012)

A new version is proposed for the universal empirical formula, EPAX, which describes fragmentation cross sections in high-energy heavy-ion reactions. The new version, EPAX 3, is shown to yield cross sections that are in better agreement with experimental data for the most neutron-rich fragments than the previous version. At the same time, the very good agreement of EPAX 2 with data on the neutron-deficient side has been largely maintained. Comparison with measured cross sections show that the bulk of the data is reproduced within a factor of about 2, for cross sections down to the picobarn range.



Update of the internal database based on AME &NUBASE 2012

The 2012 Atomic Mass Evaluation (AME2012)

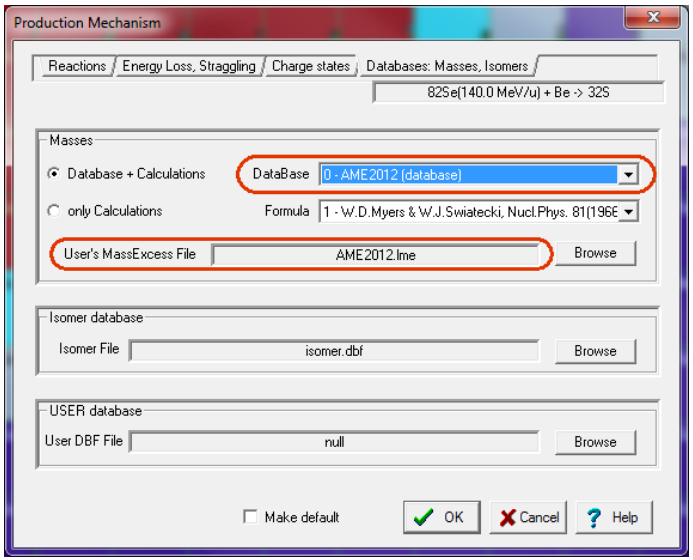
The evaluation has been published in Chinese Physics C 36 (2012) 1287-1602 (PDF), 1603-2014 (PDF).

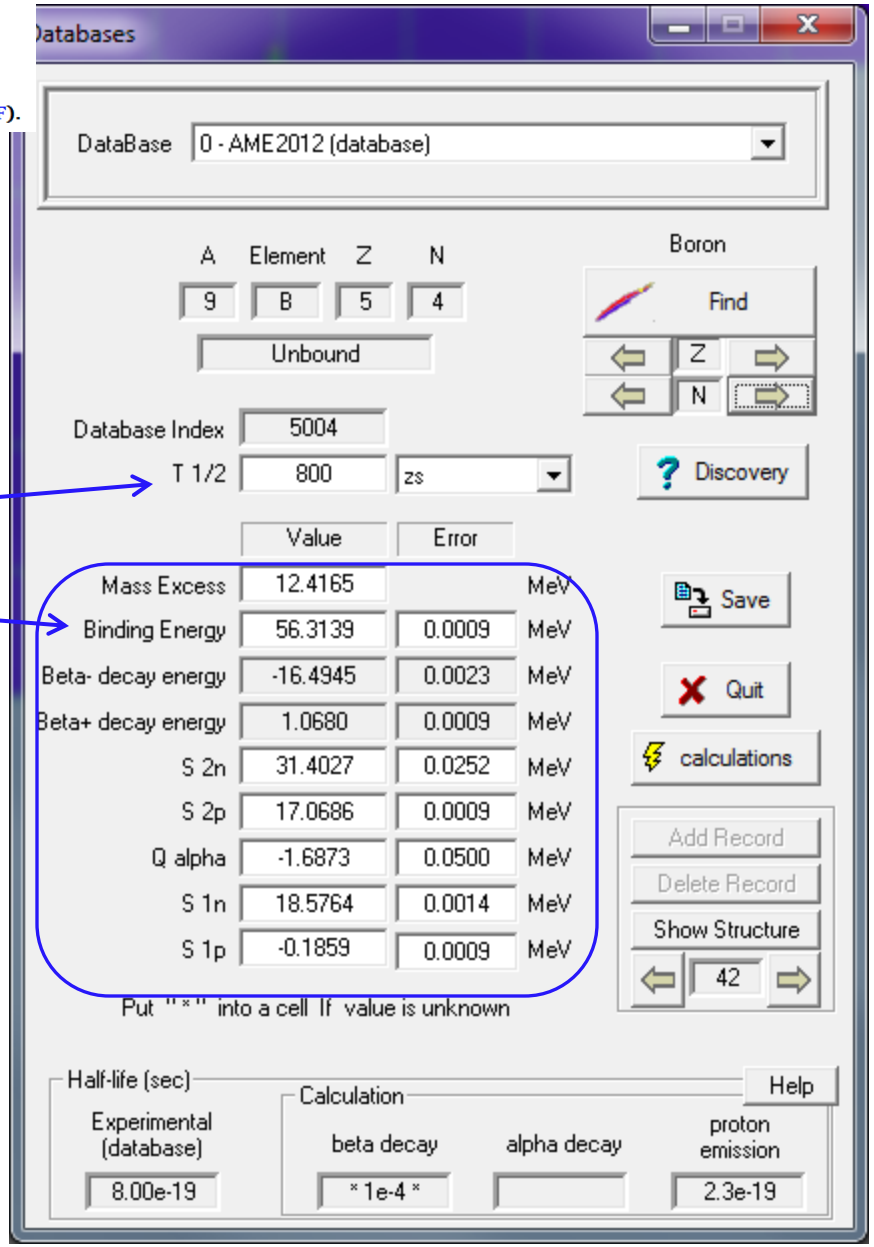
The 2012 Nubase Evaluation (Nubase2012)

The evaluation has been published in Chinese Physics C 36 (2012) 1157-1286 (PDF).

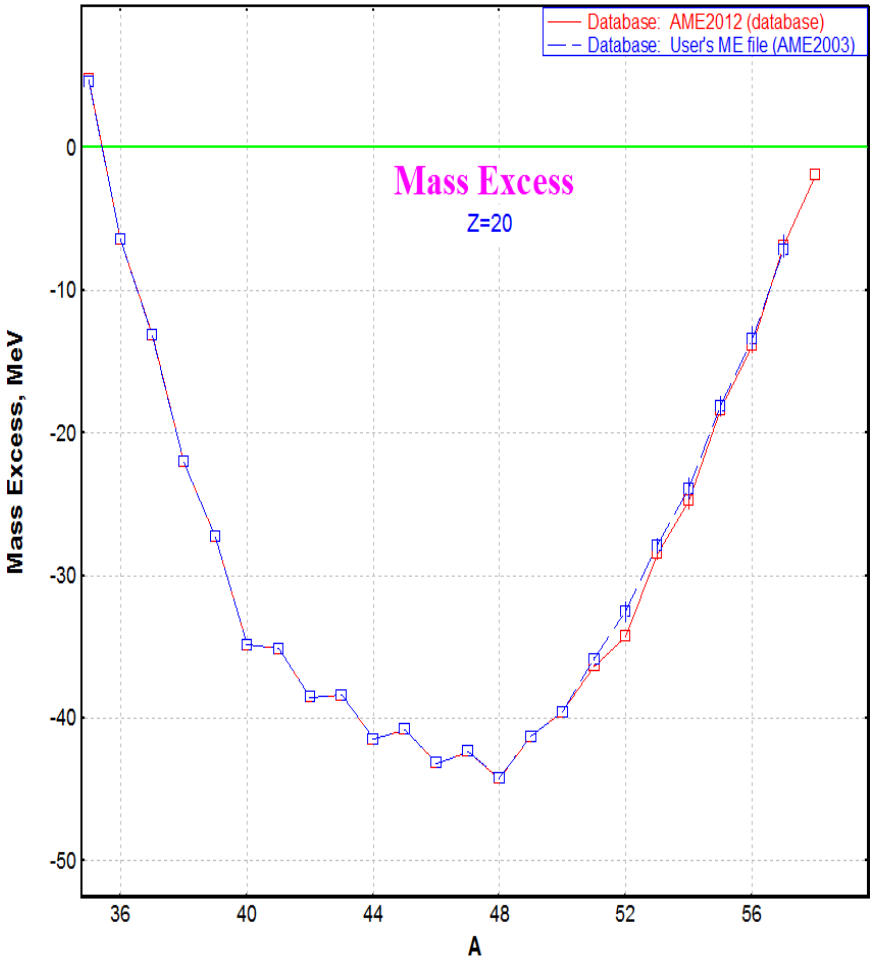
NUBASE 2012

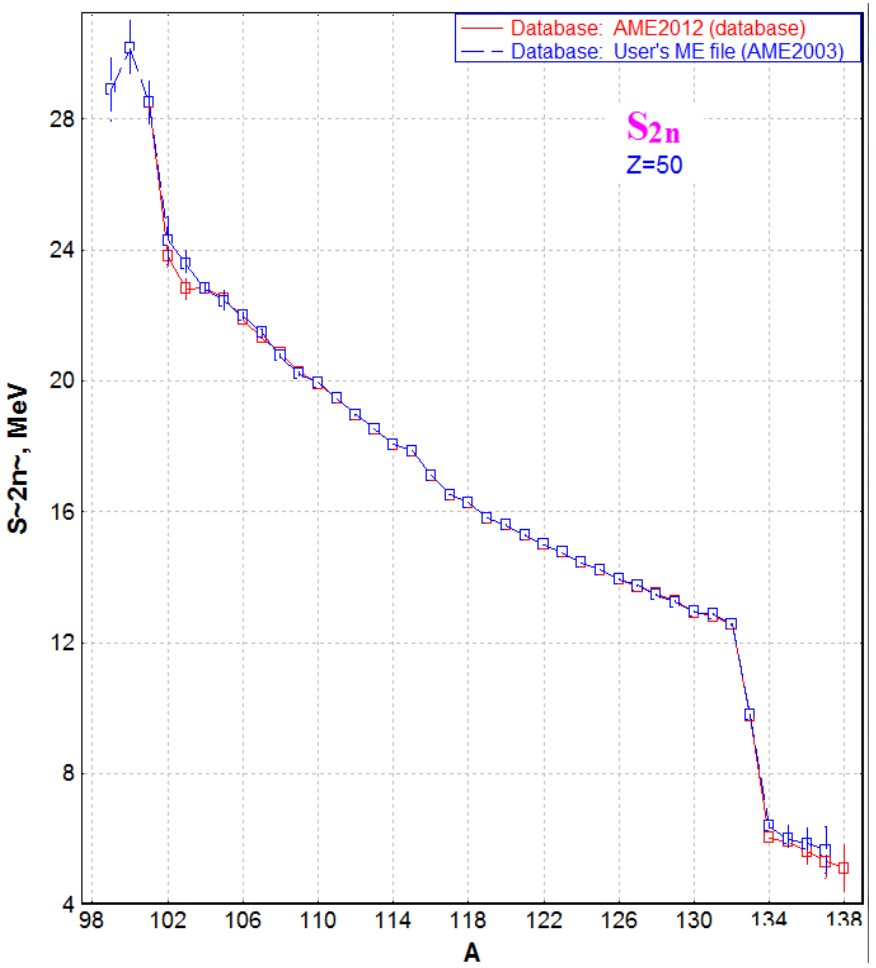
AME 2012





Comparison AME2003 & AME 2012 for Z=20 & 50





Probability for compound nucleus formation

PHYSICAL REVIEW C **78**, 034610 (2008)

Synthesis of superheavy nuclei: A search for new production reactions

Valery Zagrebaev[1] and Walter Greiner[2]
[1]*Flerov Laboratory of Nuclear Reactions, JINR, Dubna, Moscow Region, Russia*
[2]*Frankfurt Institute for Advanced Studies, J. W. Goethe-Universität, Frankfurt, Germany*
(Received 23 May 2008; published 24 September 2008)

Nuclear reactions leading to the formation of new superheavy (SH) elements and isotopes are discussed in the paper. "Cold" and "hot" synthesis, fusion of fission fragments, transfer reactions, and reactions with radioactive ion beams are analyzed along with their abilities and limitations. If the possibility of increasing the beam intensity and the detection efficiency (by a total of one order of magnitude) is found, then several isotopes of new elements with $Z = 120$–124 could be synthesized in fusion reactions of titanium, chromium, and iron beams with actinide targets. The use of light- and medium-mass neutron-rich radioactive beams may help us fill the gap between the SH nuclei produced in the hot fusion reactions and the mainland. In these reactions, we may really approach the "island of stability." Such a possibility is also provided by the multinucleon transfer processes in low-energy damped collisions of heavy actinide nuclei. The production of SH elements in fusion reactions with accelerated fission fragments looks less encouraging.

$$P_{\mathrm{CN}}(E^*, l) = \frac{P^0_{\mathrm{CN}}}{1 + \exp\left[\dfrac{E^*_B - E^*_{\mathrm{int}}(l)}{\Delta}\right]},$$

where

$$P^0_{\mathrm{CN}} = \frac{1}{1 + \exp\left[\dfrac{Z_1 Z_2 - \zeta}{\tau}\right]},$$

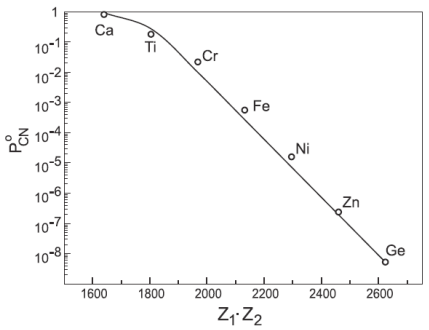
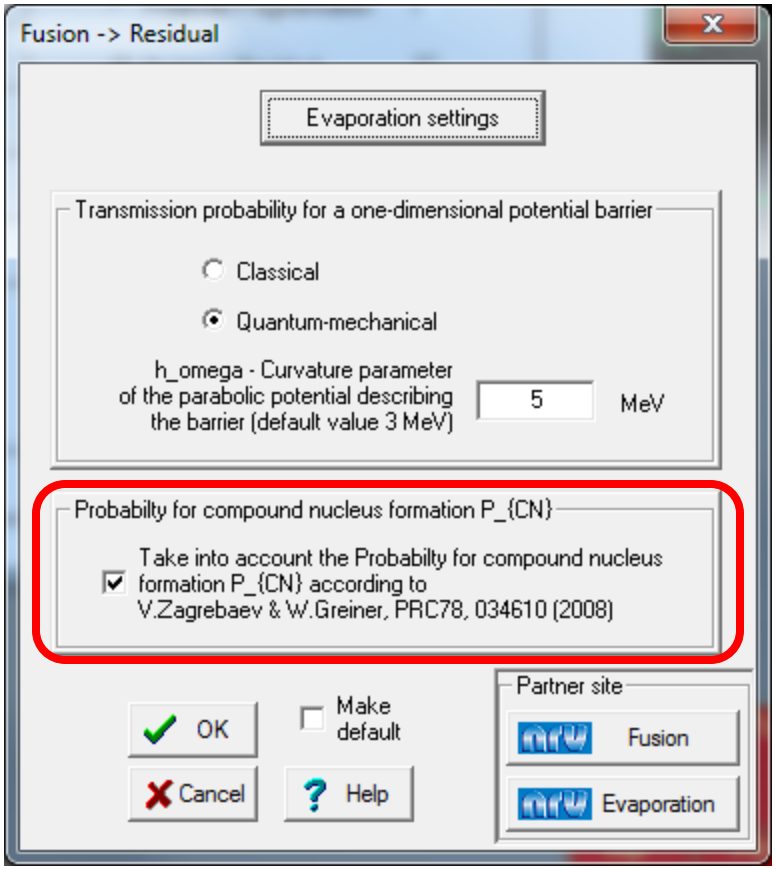


FIG. 5. Above-barrier CN formation probability in the ^{208}Pb induced fusion reactions. Results of calculation are shown by the circles, whereas the fitted curve corresponds to expression (3).



Probability for compound nucleus formation

PHYSICAL REVIEW C **78**, 034610 (2008)

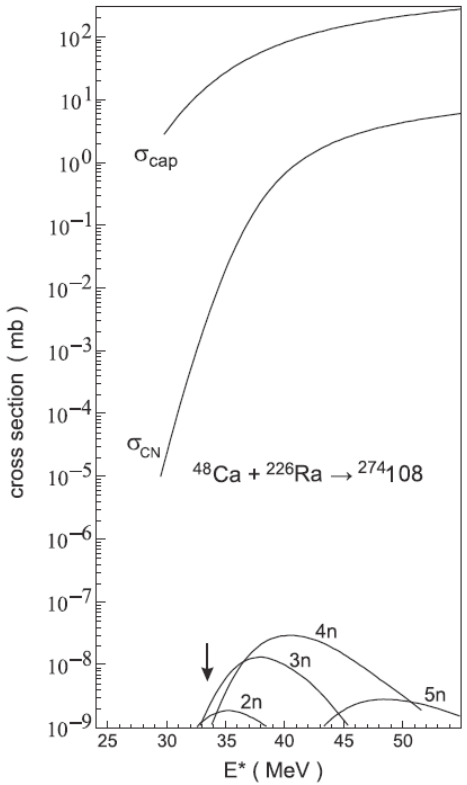
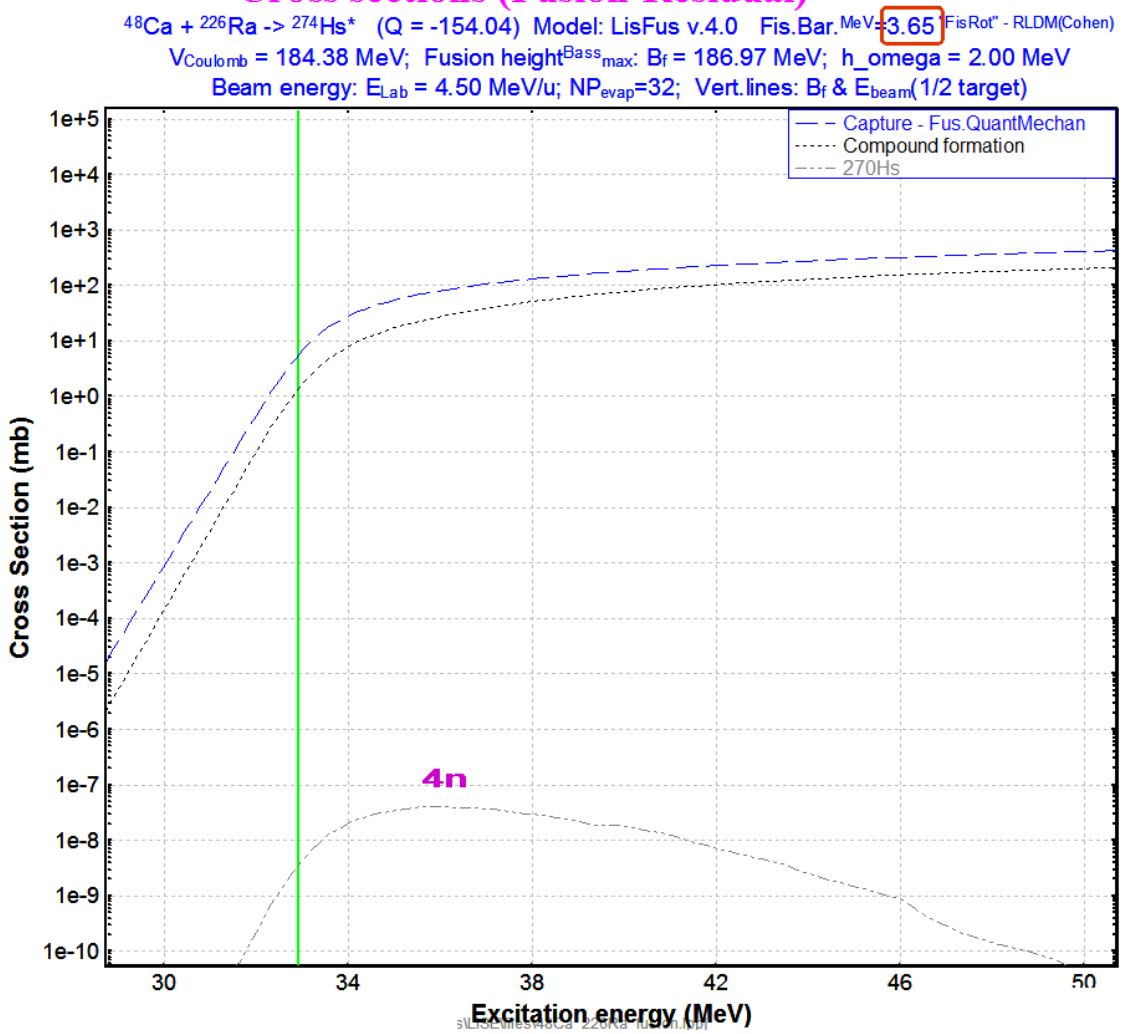


FIG. 7. Calculated capture, fusion, and evaporation residue ($2n$, $3n$, $4n$, and $5n$ channels) cross sections in the $^{48}Ca + ^{226}Ra$ fusion reaction. The arrow indicates the Bass barrier.

Cross sections (Fusion-Residual) [with P_{CN}]



LISE++ site address and download link

New address:

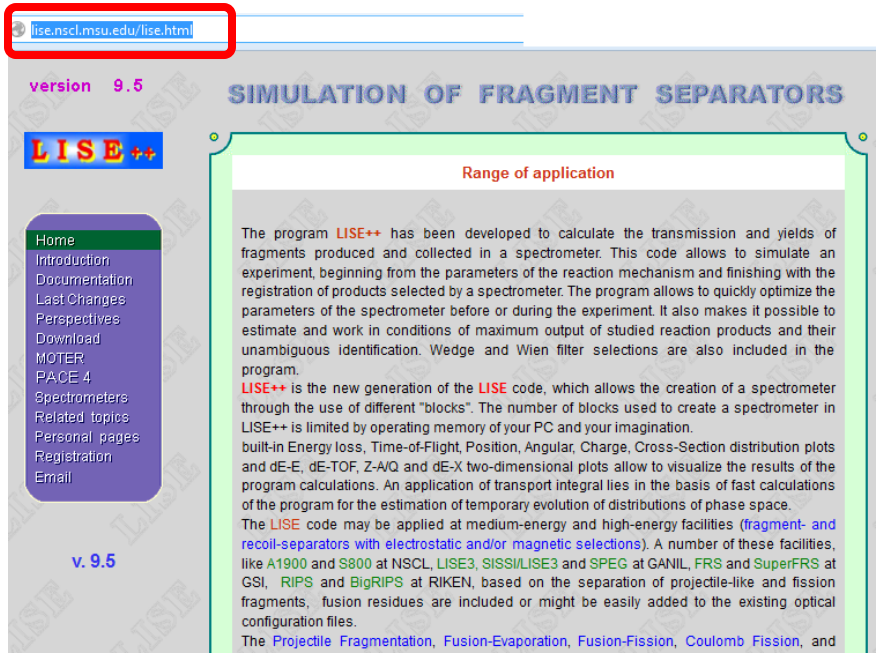
http://lise.nscl.msu.edu

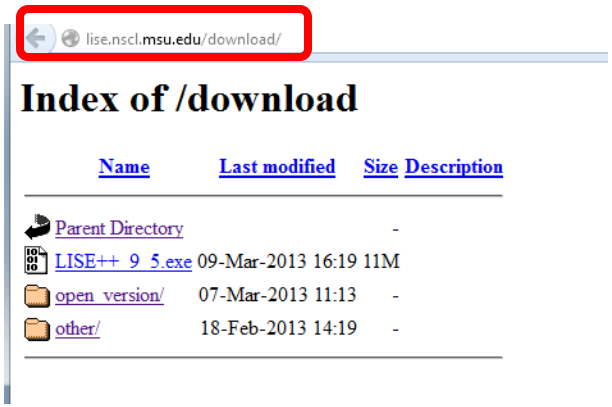
Redirection from previous addresses

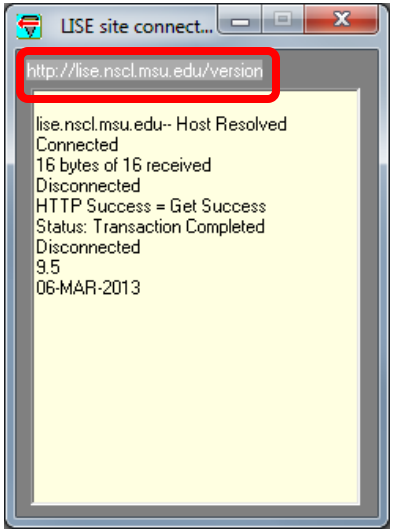
http://www.nscl.msu.edu/lise
http://groups.nscl.msu.edu/lise

New download link is
http://lise.nscl.msu.edu/download

No more FTP-server to download the LISE++ package







Update of Transmission calculations

		transmission calculations up to LAST optical block, not for LAST Q-optical block --
9.4.107	03/04/13	come back to 9.4.94 version
9.4.094	02/22/13	transmission calcualtions not up to next optical block, only for Q-optical block
9.4.065	11/29/12	inter2 -- distribution2 --- modification
9.4.064	11/29/12	inter2 -- distribution2 --- modification
9.3.8	03/06/12	Correction in the Dispersion method for secondary target
9.3.6	02/28/12	Apperture for RotationBlocks are disable by default
9.3.6	02/22/12	LowMatrixLimit set to 1e-10. It is not applied for RotationBlocks
9.3.6	02/22/12	PassAperture : Fixed FLAG for X-use! Important!!!!
9.3.6	02/22/12	If Length of Block <=0 bounds are used just in one poind as slits! Important!!!!
9.3.6	02/22/12	Enevelope plot: axis title has been changed
9.3.11	01/20/12	Faraday cup -- possibility to make it disable from the Setup window

Fixed bugs

9.4.097	02/26/13	Fixed: bug with contour projection in MC mode (request of MP, Koeln)
9.4.089	01/28/13	Optics Quad Setup : corrections for second order labels
9.4.088	01/28/13	Fixed: bug in read/write buncher subroutine
9.4.086	01/24/13	Bug in the case charge state & stripper. OPTION SET "NO(ONLY FOR MIDDLE POINT)
9.4.055	10/30/12	Read/Write in/to file correction for EPAX mode
9.4.035	08/27/12	Corrections for G_CalcReaction in the case of AF from the AF dialog (fixed)
9.4.002	03/15/12	Fixed: calculated transmission has been cleared during reading file from disk

LISE^{++} site statistics (2012)

Link