

**v.17.6.11**  
07/10/24

- Update of the Convolution momentum model for low separation energies
- New LDM3 with shell corrections
- FRIB logo application
- The Beam Dump utility update
- PAC3 rates – open access

$^{48}\text{Ca} \rightarrow ^{42}\text{S}$

$^{48}\text{Ca} \rightarrow ^{49}\text{Ca}$  (pickup case)

Convolution of Gaussian (Fragmentation) and Exponent (Friction) distributions

$^{48}\text{Ca} (140.0 \text{ MeV/u}) + \text{Be} \rightarrow ^{42}\text{S}$

$$f(p) \approx \exp\left(\frac{p}{\tau}\right) \cdot \left[ 1 - \text{ferr}\left(\frac{p - p_0 + \frac{\sigma_{11}^2}{\tau} - \text{shift} \cdot \tau}{\sqrt{2} \sigma_{11}}\right) \right]$$

$$\sigma_{11}^2 = \left(\sigma_0^{\text{conv}} \sqrt{\beta_F}\right)^2 \frac{A_F^*(A_P - A_F^*)}{A_P - 1} \quad \tau = \frac{\text{coef}}{\beta} \sqrt{A_F^* E_S}$$

Settings for Gaussian distribution

$P_0$  (MeV/c) = 22226  
 $V_F / V_B$  from settings = 0.994  
 Mom. distribution = [1] D.J.M.  
 $\sigma_0$  = 87 MeV/c  
 $\sigma_{11}$  = 244.5 MeV/c (\*)

Settings for convolution

Separation Energy Model	$E_{\text{separation}}$	$\sigma_0^{\text{conv}}$	coef	shift	FWHM / 2.355 (*)	tau	P ( $Y_{\text{max}}$ )	$V_F / V_B$ peak	$V_F / V_B$ mean
<input type="radio"/> 0. Energy from Qg	26	91.5	3.344	0.158	183.9	231.3	22079	0.997	0.993
<input type="radio"/> 1. Excitation from dSurface	11.7	91.5	3	0.149	157.1	139.2	22137	0.998	0.996
<input checked="" type="radio"/> 2. Excitation from the Abrasion model	41.2	160	1	-1	230.1	87.1	22094	0.994	0.994

MeV MeV/c MeV/c MeV/c

$\sigma_0^{\text{conv}}$  = 160 MeV/c  $g$  = 0.95 MeV/fm<sup>2</sup> (\*) - with  $\gamma$ -factor

Use a Gaussian model (DJM) if  $E_{\text{separation}}$  in the Convolution model  $\leq 0$

Plot 1D Convolution Analysis Make default OK Cancel Help

Convolution of Gaussian (Fragmentation) and Exponent (Friction) distributions

$^{48}\text{Ca} (140.0 \text{ MeV/u}) + \text{Be} \rightarrow ^{49}\text{Ca}$

$$f(p) \approx \exp\left(\frac{p}{\tau}\right) \cdot \left[ 1 - \text{ferr}\left(\frac{p - p_0 + \frac{\sigma_{11}^2}{\tau} - \text{shift} \cdot \tau}{\sqrt{2} \sigma_{11}}\right) \right]$$

$$\sigma_{11}^2 = \left(\sigma_0^{\text{conv}} \sqrt{\beta_F}\right)^2 \frac{A_F^*(A_P - A_F^*)}{A_P - 1} \quad \tau = \frac{\text{coef}}{\beta} \sqrt{A_F^* E_S}$$

Settings for Gaussian distribution

$P_0$  (MeV/c) = 25918  
 $V_F / V_B$  from settings = 0.986  
 Mom. distribution = [1] D.J.M.  
 $\sigma_0$  = 87 MeV/c  
 $\sigma_{11}$  = 100.2 MeV/c (\*)

Settings for convolution

Separation Energy Model	$E_{\text{separation}}$	$\sigma_0^{\text{conv}}$	coef	shift	FWHM / 2.355 (*)	tau	P ( $Y_{\text{max}}$ )	$V_F / V_B$ peak	$V_F / V_B$ mean
<input type="radio"/> 0. Energy from Qg	0	91.5	3.344	0.158	100.3	0	25563	0.994	0.986
<input type="radio"/> 1. Excitation from dSurface	0	91.5	3	0.149	100.3	0	25563	0.994	0.986
<input checked="" type="radio"/> 2. Excitation from the Abrasion model	0	160	1	-1	100.3	0	25563	0.994	0.986

MeV MeV/c MeV/c MeV/c

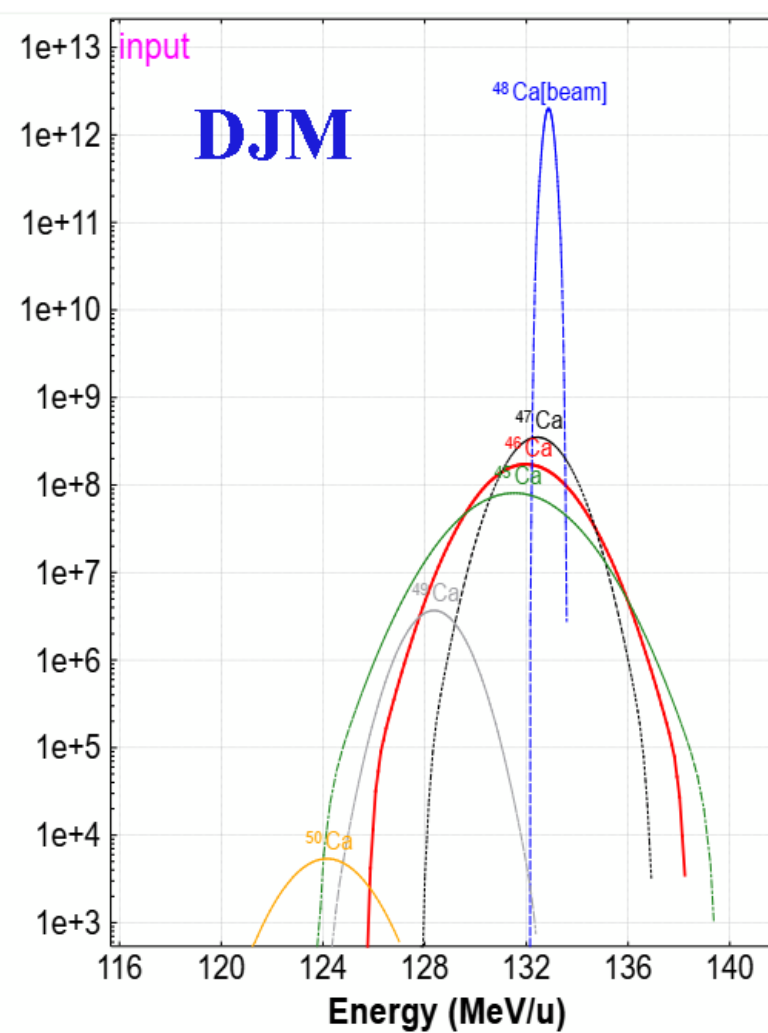
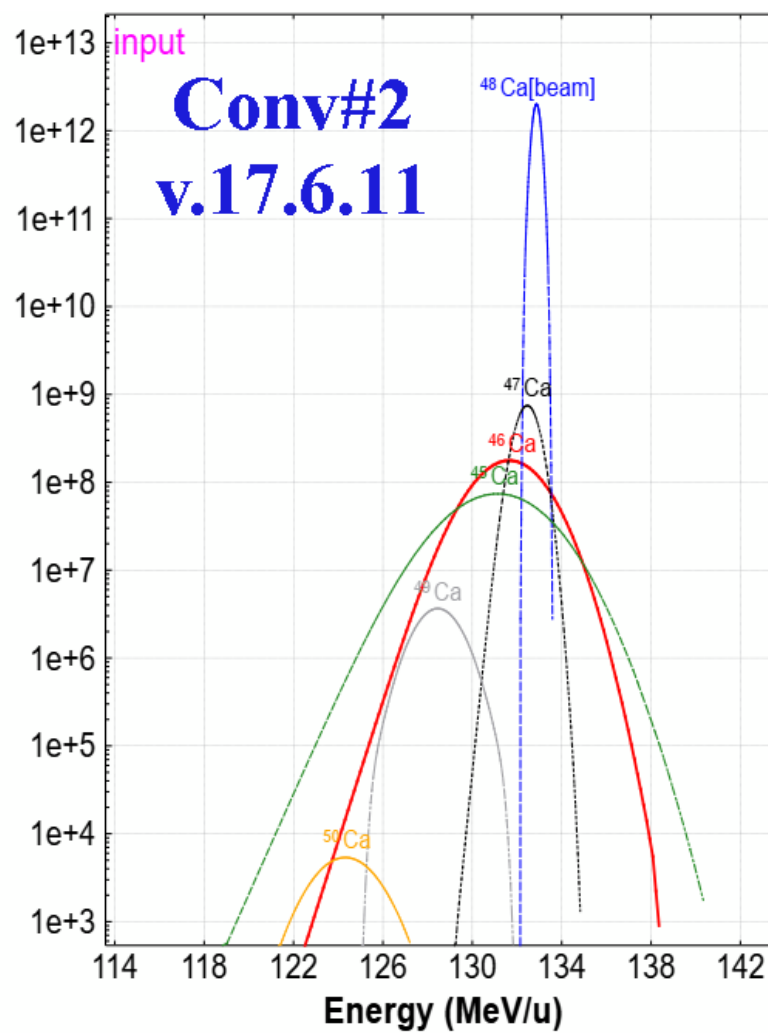
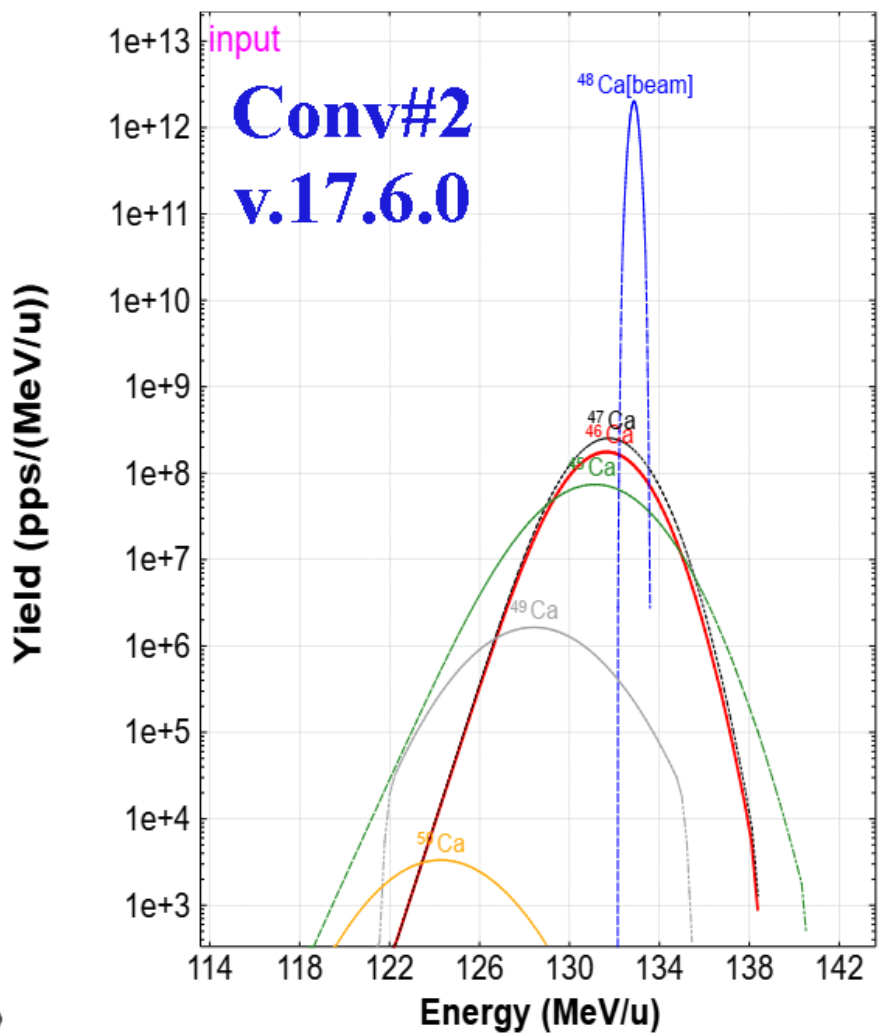
$\sigma_0^{\text{conv}}$  = 160 MeV/c  $g$  = 0.95 MeV/fm<sup>2</sup> (\*) - with  $\gamma$ -factor

Use a Gaussian model (DJM) if  $E_{\text{separation}}$  in the Convolution model  $\leq 0$

Plot 1D Convolution Analysis Make default OK Cancel Help

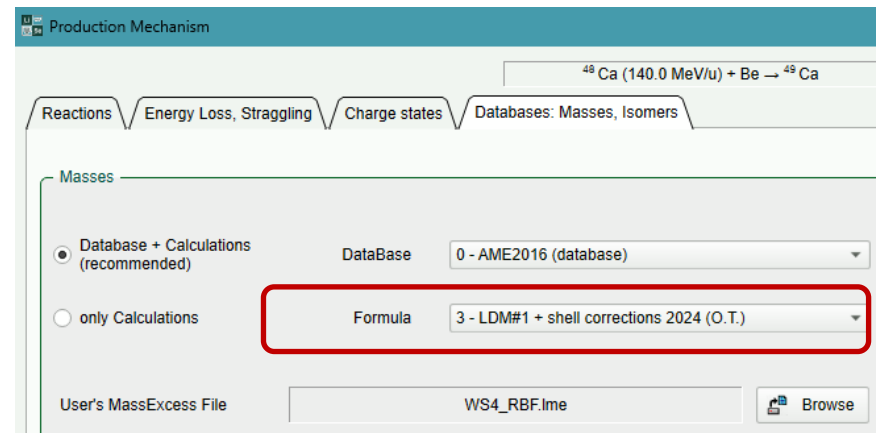
The CheckBox is Set by default

**NEW**



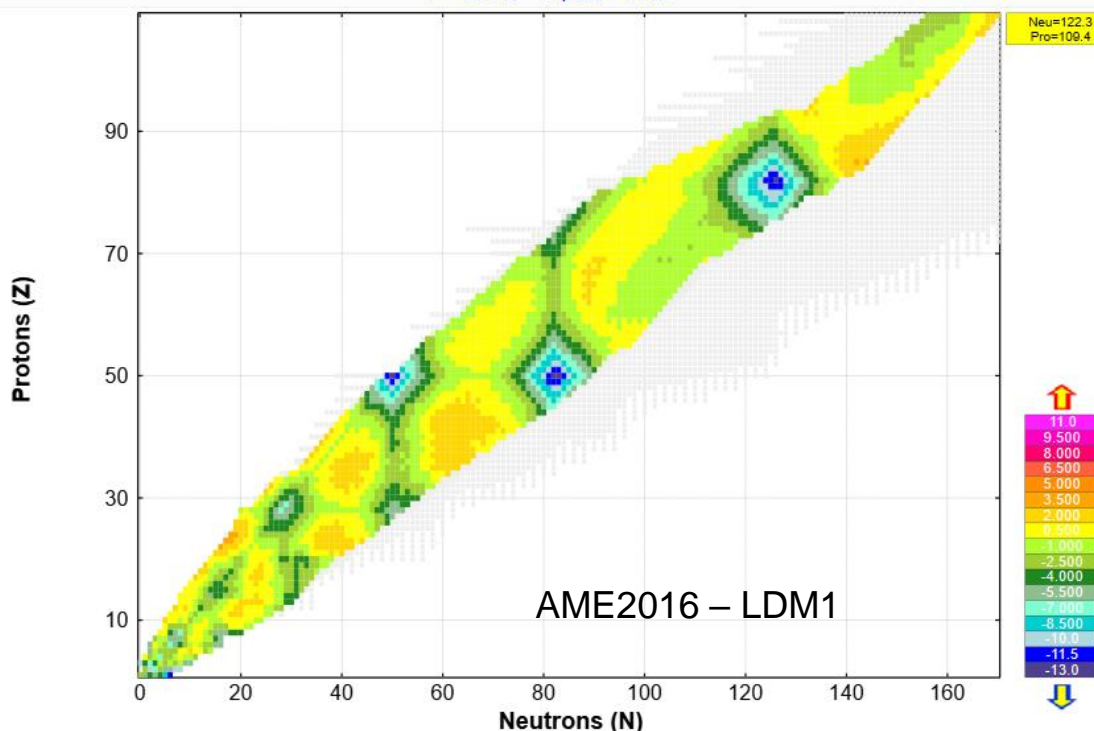
Main purpose : using for extrapolation of mass tables

- Based on AME2020
- New Shell crossings implemented
- Set as default for calculation (extrapolation)



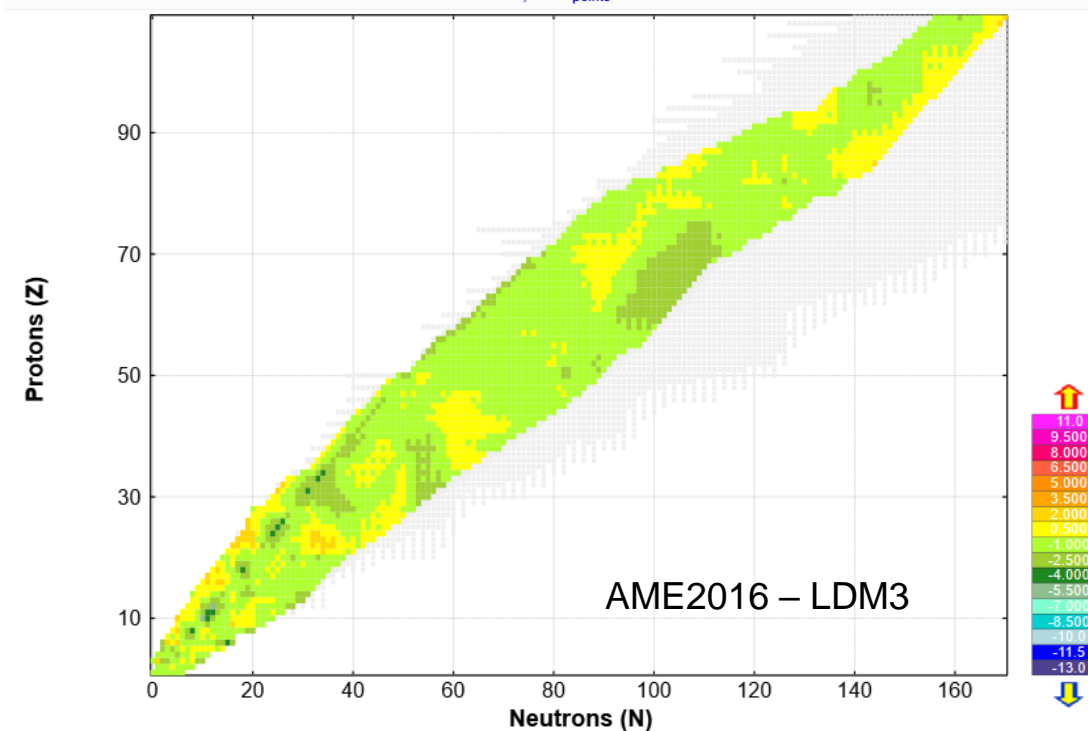
### Mass Excess (difference between models)

<Database: AME2016 (database)> and <Calculation: 1 - W.D.Myers & W.J.Swiatecki, Nucl.Phys. 81(1966)1>  
 N=0-200  
 $\sigma = 2.636$ ;  $N_{\text{points}} = 3358$

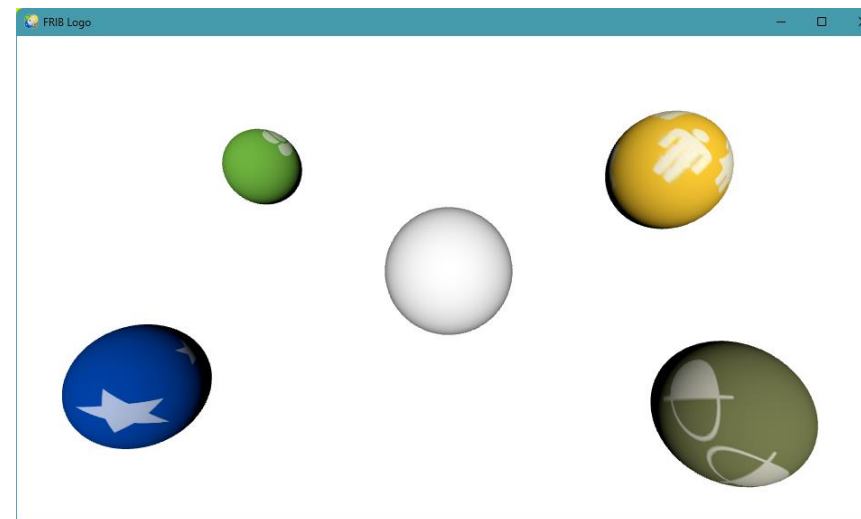
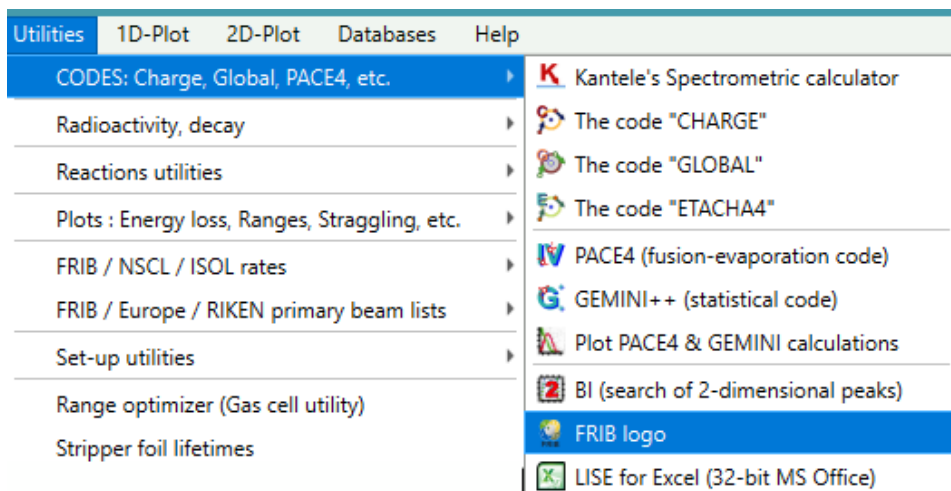


### Mass Excess (difference between models)

<Database: AME2016 (database)> and <Calculation: 3 - LDM#1 + shell corrections 2024 (O.T.)>  
 N=0-200  
 $\sigma = 0.825$ ;  $N_{\text{points}} = 3358$



Sasha T.'s project



Three Beam Dump spatial parameters have been added to LISE file

```
[finger]
    Diffuseness = 0.01
    Suppression = 1e+12
    BeamDumpBlock = BTS01b_D1ex
    BD_usePrevious = 0
    BD_LongDistance = 616.5      mm
    BD_distTransverse = 8.34    mm
    BD_Center = 75              mm
```

Access to PAC3 rates is open.  
No more construction notes and password.

plot: FRIB rates	v.3.0 using EPAX 3.01 : 2024 PAC3
plot: FRIB beams	v.2.02 using EPAX 3.01 : 2022 PAC2
link: FRIB (v.2.01)	ratio v.3.0 / v. 2.02
Location of "FRIB" isotopes	
NSCL PAC35	v.1.08 using EPAX 2.15 : 400 kW
ISOL	v.1.08 using EPAX 2.15 : 1st year
	v.1.08 using EPAX 2.15 : 2nd year
	v.1.07 using EPAX 3.01 : 400 kW