



Multiphysics, seven incident particles nuclear data libraries generation: TENDL-2025

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The making of TENDL-2025 – repeatability and innovation

- **7 incident particles:** alpha, gamma, deuteron, proton, helium, triton and neutron induced libraries
- 2850 targets Z=3-115, Lithium to Moscovium, **including as target some 519 m (1st), 29 n (2nd) isomeric states ($T_{1/2} > 1\text{s}$)**
- TENDL describes all open reaction channels, product yields, emitted spectra and short-lived daughter radionuclides ($T_{1/2} > 0.1\text{s}$) up to 200 MeV, with covariance derived from **reference input parameters variation allowing S/UQ & P**

Neutron sub-library

Nuclear landscape: Isotopic targets: 2850

7 incident particles

- neutron*
- gamma
- proton
- deuteron
- triton
- alpha
- helion

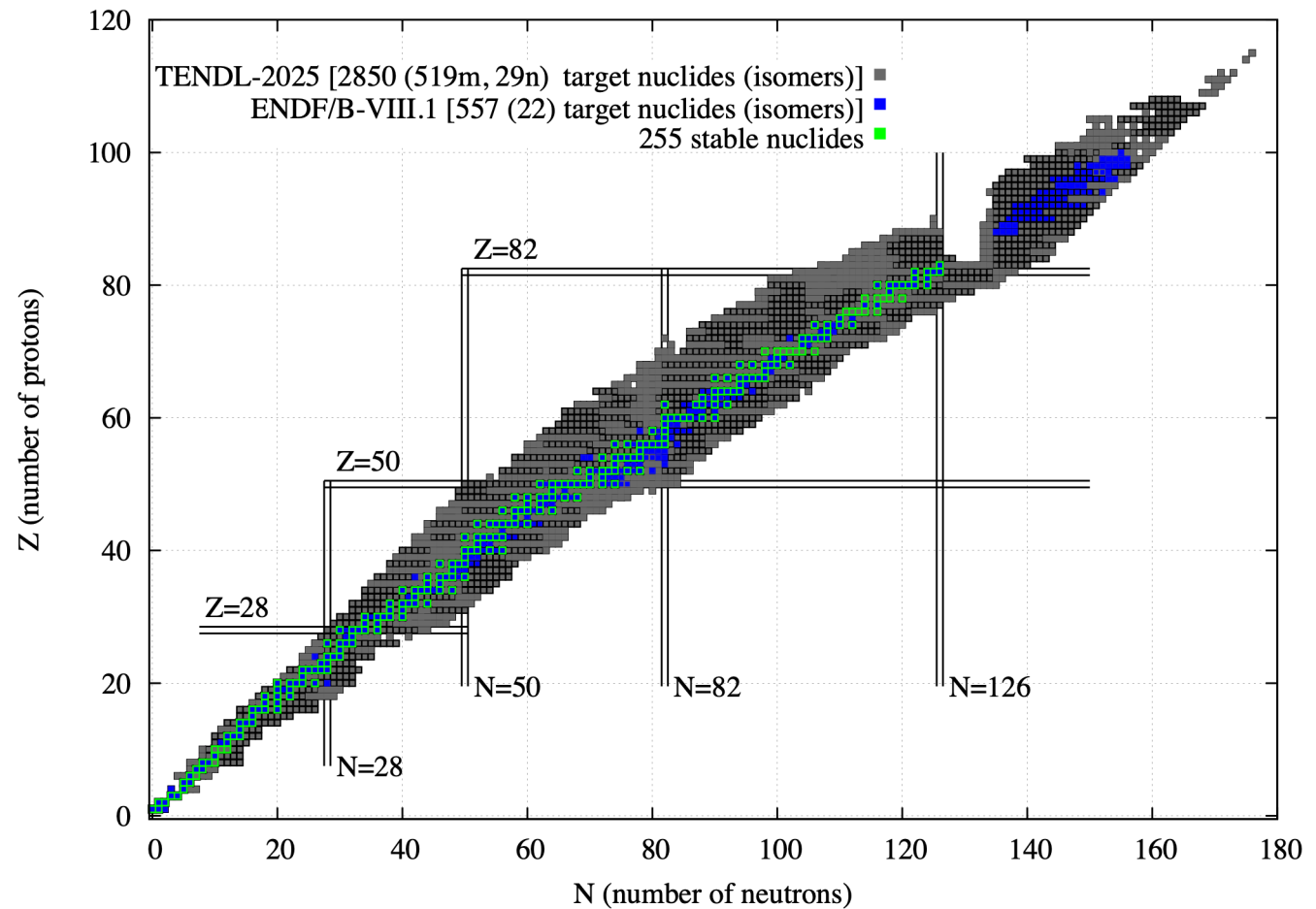
*complete for transport,
activation-transmutation-
material sciences in term of
MF's, targets and daughters

816 in EAF-2010

795 in JENDL-5

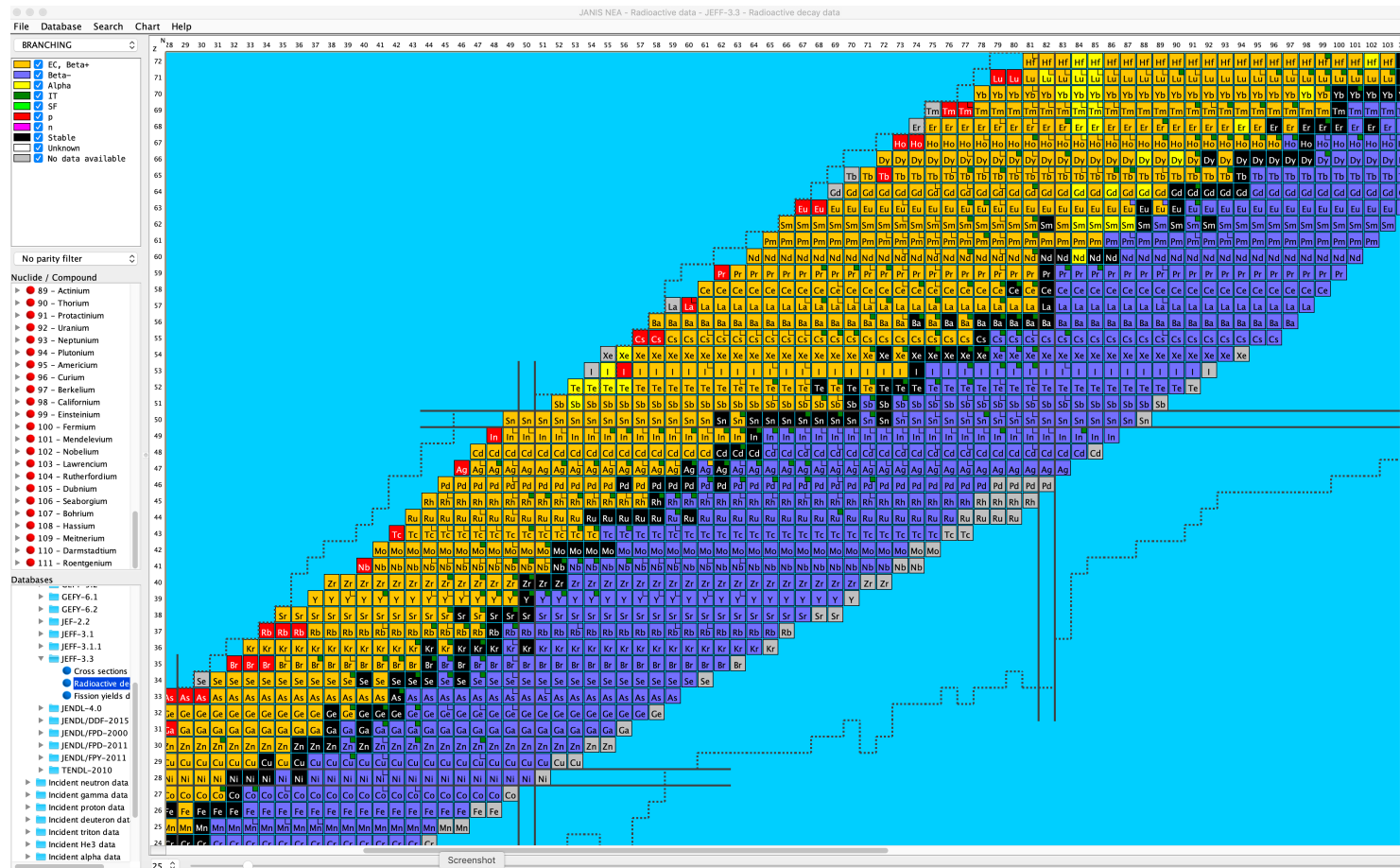
~580 in ENDF/B, JEFF, CENDL

1036 for $T_{1/2} > 1$ hr + inclusive
of all “special” from the above
legacy libraries



UK Atomic
Energy
Authority

MF-8 contains the metastable **Elevel** from RIPL-4

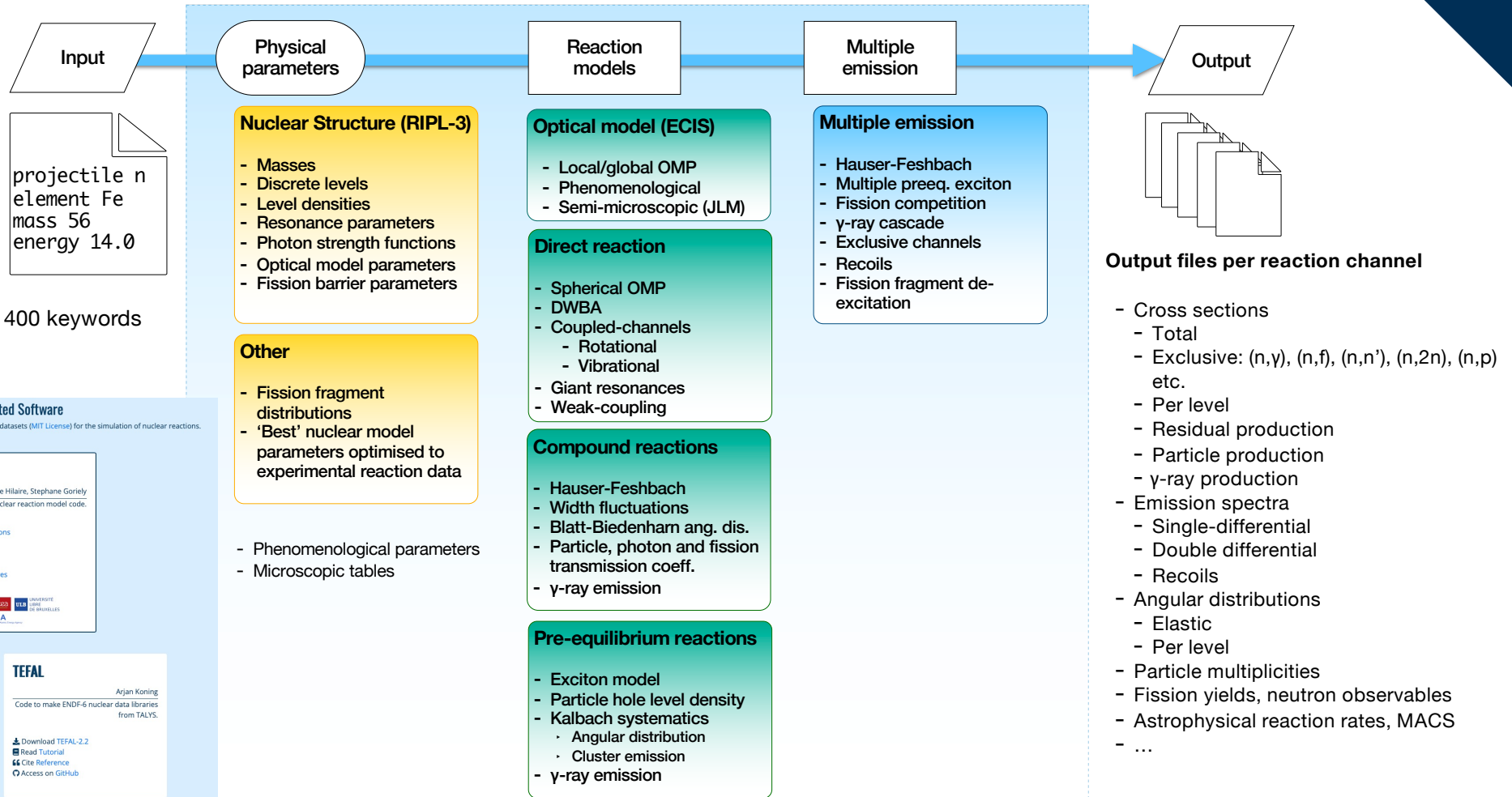


UK Atomic
Energy
Authority

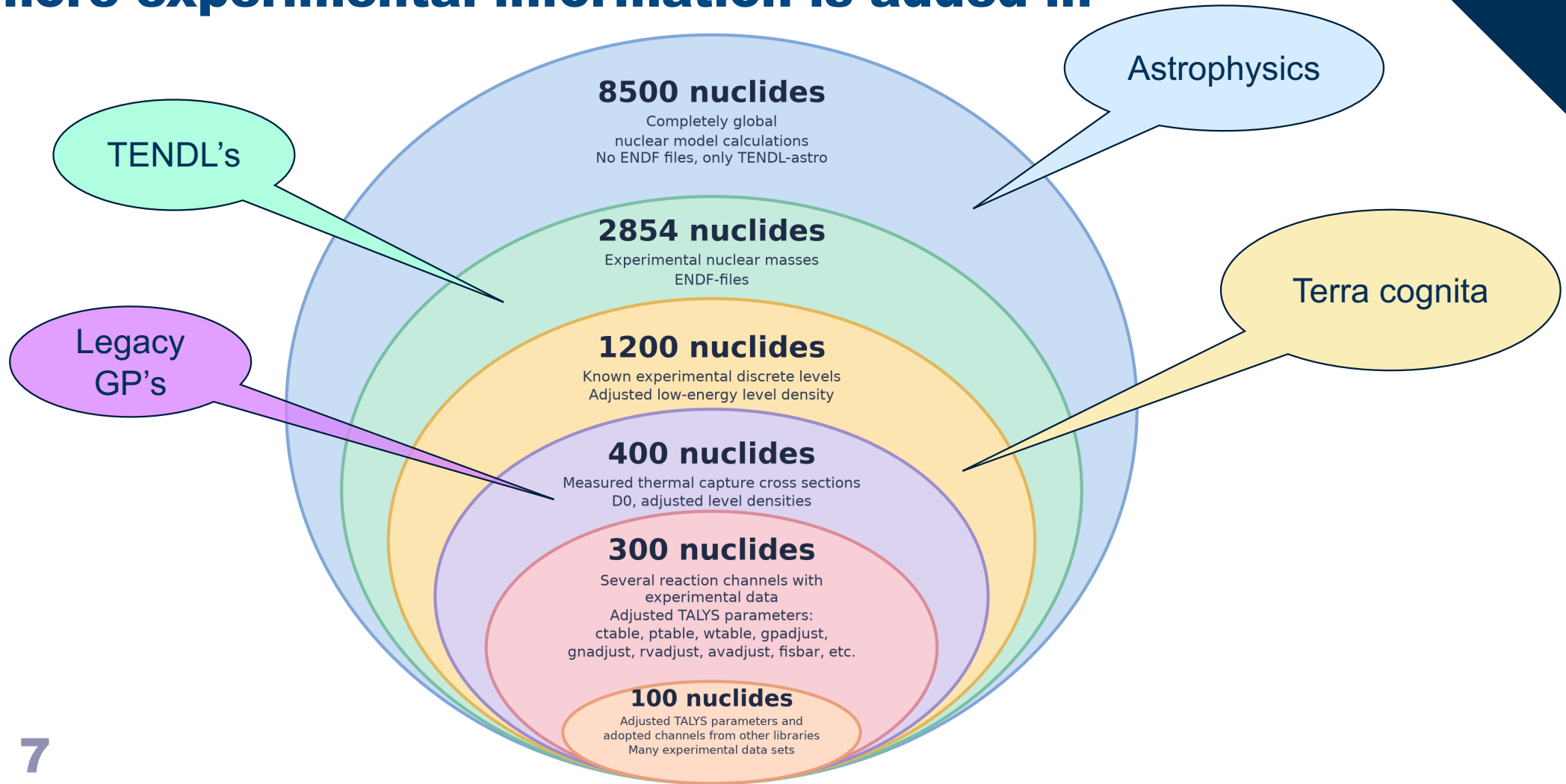
- ## TALYS-based evaluated nuclear data library

A set of tools, called To, was used to produce it. T6 stands for TALYS, TEFAL, TASMAN, TARES, TAFIS and TANES. Each code produces a part of the library. Processing tools such as NJOY, CALENDF, PREPRO are also used in T6. These codes, and the processing steps are developed by A.J. Koning, D. Rochman and J.Ch. Sublet. Still, the help and feedback of the whole nuclear data, processing and user community is extremely useful. TENDL would not exist without the constructive remarks from all over the world.

How? TALYS 2.2 from <https://nds.iaea.org/talys/>



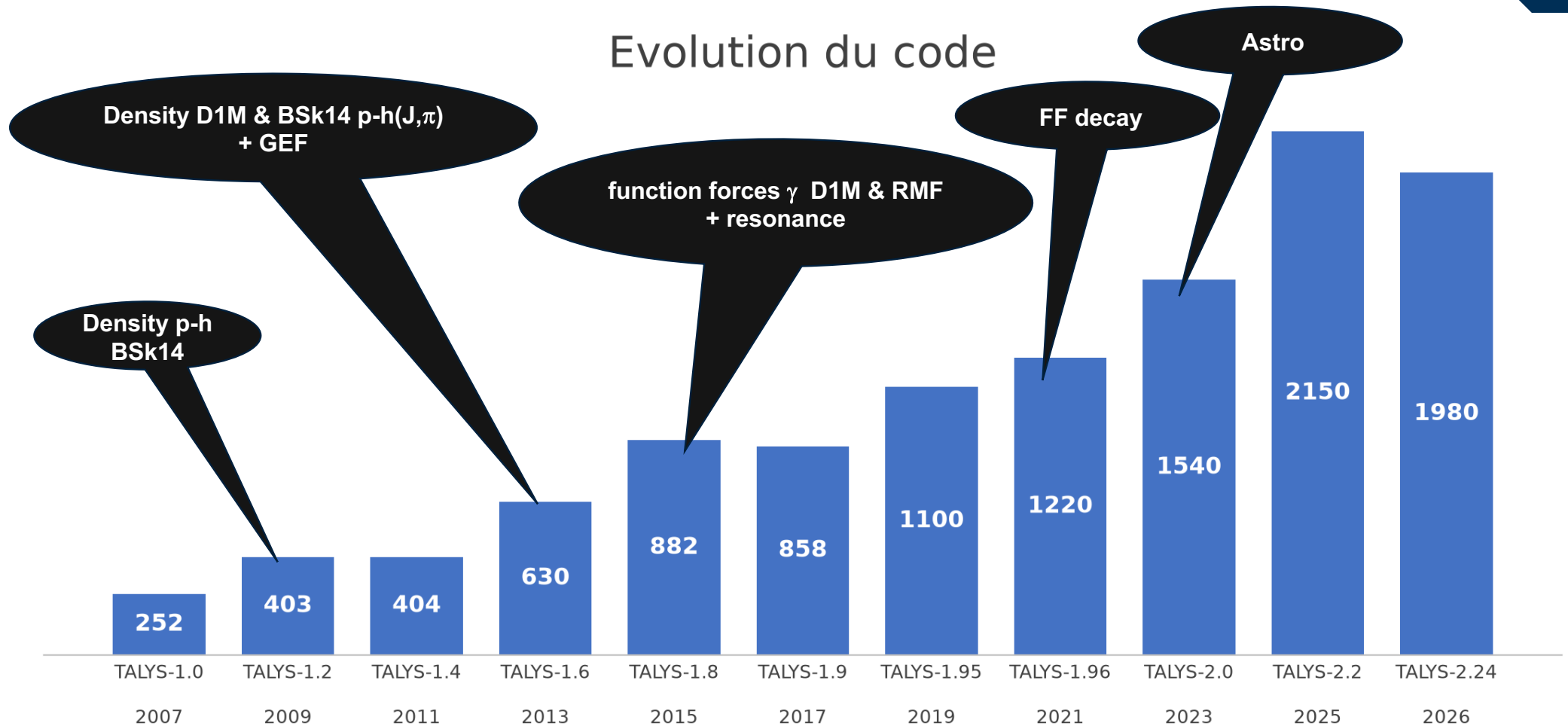
TENDL Nuclear Data Library: progressively more experimental information is added in



TALYS time steps evolution

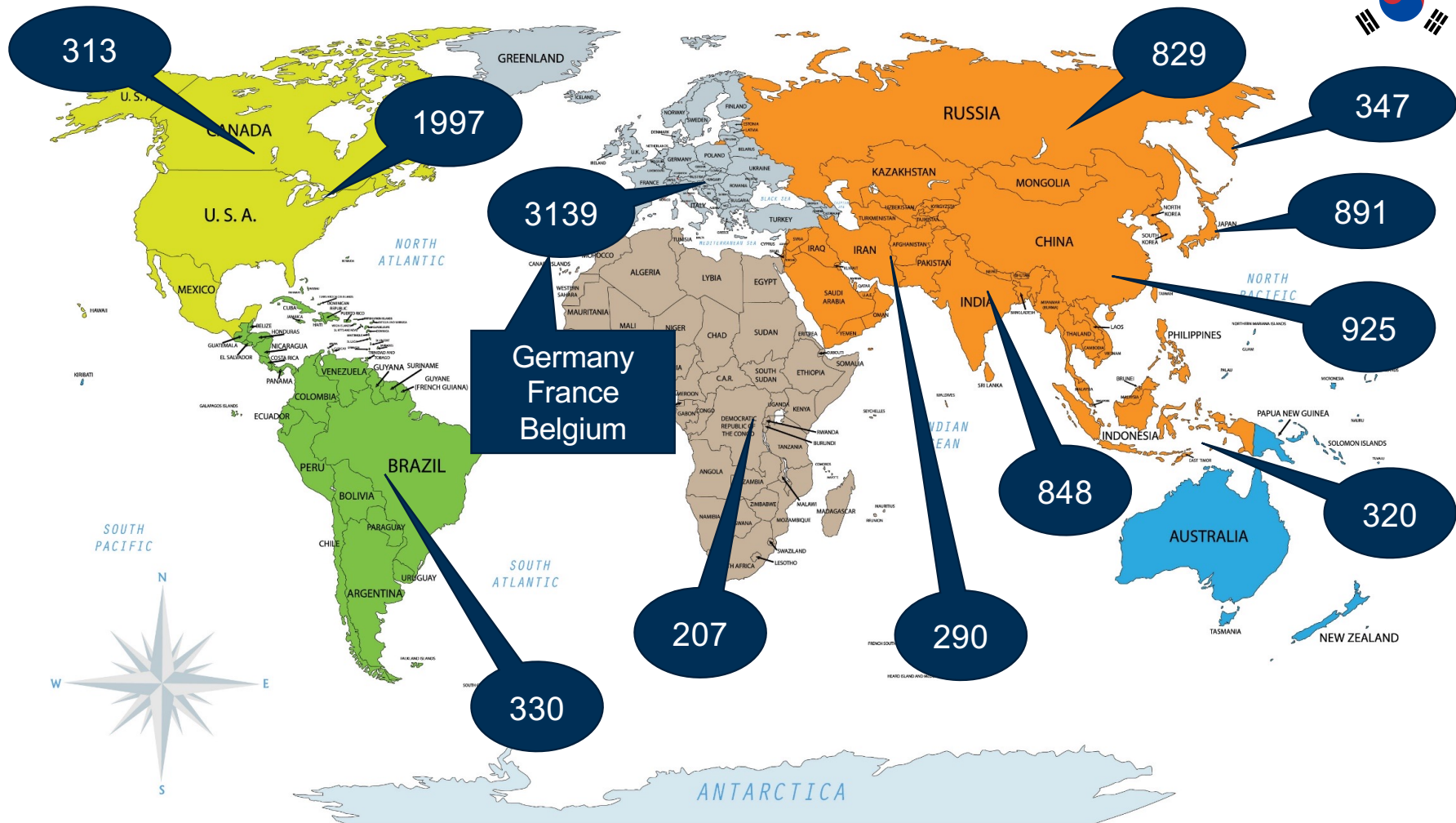


Evolution du code



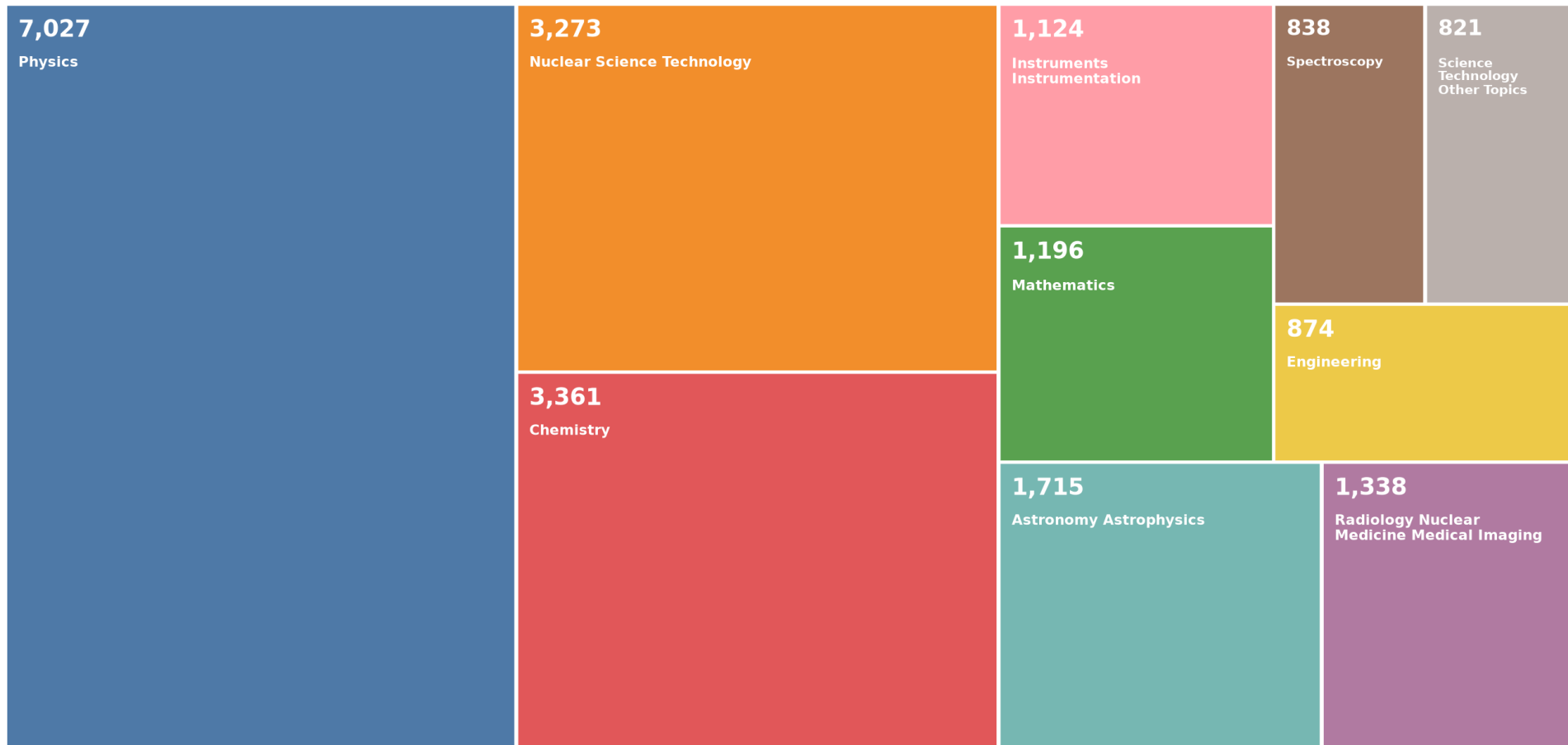
TALYS around the World

Around 9054 citations (web of sciences)



TALYS citations by research areas

Around 9054 citations (web of sciences) – area boxes overlap – top 10 only



The framework T3: TALYS, TEFAL, TASMAM + resbase

TALYS

Arjan Koning, Stephane Hilaire, Stephane Goriely
Nuclear reaction model code.

- Download [TALYS-2.2](#)
- Previous and Other Versions
- Read [Tutorial](#)
- Cite [Reference](#)
- Use [TALYSworld](#)
- Watch [TALYS video lectures](#)
- Access on [GitHub](#)

Created at    UNIVERSITÉ
LIBRE
DE BRUXELLES
 IAEA
International Atomic Energy Agency

<https://nds.iaea.org/talys/>
and GitHub

TASMAN

Arjan Koning

Statistical software for TALYS: Uncertainties,
sensitivities and optimization.

- Download [TASMAN-2.2](#)
- Read [Tutorial](#)
- Cite [Reference](#)
- Access on [GitHub](#)

TEFAL

Arjan Koning

Code to make ENDF-6 nuclear data libraries
from TALYS.

- Download [TEFAL-2.2](#)
- Read [Tutorial](#)
- Cite [Reference](#)
- Access on [GitHub](#)

RESONANCETABLES

Arjan Koning, Dimitri Rochman

Database for thermal cross sections, MACS
and resonance parameters.

- Download [RESONANCETABLES-2.2](#)
- Read [Tutorial](#)
- Cite [Reference](#)
- Access on [GitHub](#)

Created at  IAEA
International Atomic Energy Agency  PSI
PAUL SCHERRER INSTITUT

Portal https://tendl.imperial.ac.uk/tendl_2025/tendl2025.html

Tabular forms

YANDF-0.4

Angle, xs direct and
compound,...

Cov.–Var. **S/UQ & P**

5 “ENDF” forms

Processed data plots

Code inputs

TENDL-2025 Nuclear data library

Neutron sub-library for C (Z=6) and A=11

Tabulated data (fast neutron range)

1. [Tabular angular distributions](#) (En - angle - cross section)
2. [Tabular residual cross sections](#) (En - Residual product - cross section)
3. [Tabular total and partial cross sections](#) (En - cross section)

Evaluated formatted data (i.e. ENDF)

1. [The TENDL file](#)
2. Special [ENDF](#) file with MF12/MT102 (so-called s20 file)
3. Special [ENDF](#) file similar to the TENDL file, but with a transition to MT5 at 60 MeV (so-called s60 file)
4. [EAF file](#) (European Activation File) and associated [covariances](#)
5. [ACF file](#) (Activation File)

Processed plots

1. Plots of the cross sections and other quantities: [plot](#)
2. Plots from PREPRO: [plot](#)
3. Processed cross sections and covariances with NJOY in 187 groups: [matrix](#)

T6 input files

acf.inp	acf.inp_cov	eaf.inp	eaf.inp_cov	energies	gpf.inp	gpf.inp_cov	gpfs20.inp
gpfs20.inp_cov	gpfs60.inp	gpfs60.inp_cov	njoy.inp	talys.inp	talys.inp.0000	talys.inp.0001	talys.inp.0002
talys.inp.0003	talys.inp.9999	tasman.inp					

Last update: Sat Jun 28 10:07:13 2025

The residual products in detail

Emitted particles and/or residual products

TENDL-2025 Nuclear data library

Neutron sub-library for Mn (Z=25) and A=56: Tabular residual cross sections

Neutron sub-library for Mn (Z=25) and A=56: Tabular production and total cross sections

Production and total cross sections												
Reaction #	Mn(n,all)	Mn(n,s)a	Mn(n,s)d	Mn(n,e)	Mn(n,s)g	Mn(n,s)he3	Mn(n,aon)	Mn(n,s)n	Mn(n,s)p	Mn(n,react)	Mn(Other)	Mn(n,s)t
Reaction #												
Partial cross sections												
Reaction #	⁵⁶ Mn(n,g)	⁵⁶ Mn(n,a)	⁵⁶ Mn(n,2a)	⁵⁶ Mn(n,3a)								
Reaction #	⁵⁶ Mn(n,He3)	⁵⁶ Mn(n,He3+a)	⁵⁶ Mn(n,He3+2a)	⁵⁶ Mn(n,t)								
Reaction #	⁵⁶ Mn(n,t+a)	⁵⁶ Mn(n,t+2a)	⁵⁶ Mn(n,t+He3)	⁵⁶ Mn(n,t+He3+a)								
Reaction #	⁵⁶ Mn(n,d)	⁵⁶ Mn(n,d+a)	⁵⁶ Mn(n,d+2a)	⁵⁶ Mn(n,d+He3)								
Reaction #	⁵⁶ Mn(n,d+d+He3+a)	⁵⁶ Mn(n,d+d+t)	⁵⁶ Mn(n,d+d+t+a)	⁵⁶ Mn(n,d+d+t+He3)								
Reaction #	⁵⁶ Mn(n,2d)	⁵⁶ Mn(n,2d+a)	⁵⁶ Mn(n,2d+He3)	⁵⁶ Mn(n,2d+t)								
Reaction #	⁵⁶ Mn(n,p)	⁵⁶ Mn(n,p+a)	⁵⁶ Mn(n,p+2a)	⁵⁶ Mn(n,p+He3)								
Reaction #	⁵⁶ Mn(n,p+He3+a)	⁵⁶ Mn(n,p+t)	⁵⁶ Mn(n,p+t+a)	⁵⁶ Mn(n,p+t+2a)								
Reaction #	⁵⁶ Mn(n,p+t+He3)	⁵⁶ Mn(n,p+d)	⁵⁶ Mn(n,p+d+a)	⁵⁶ Mn(n,p+d+2a)								
Reaction #	⁵⁶ Mn(n,p+d+He3)	⁵⁶ Mn(n,p+d+t)	⁵⁶ Mn(n,p+d+t+a)	⁵⁶ Mn(n,p+d+t+He3)								
Reaction #	⁵⁶ Mn(n,p+2d+a)	⁵⁶ Mn(n,2p)	⁵⁶ Mn(n,2p+a)	⁵⁶ Mn(n,2p+2a)								
Reaction #	⁵⁶ Mn(n,2p+He3)	⁵⁶ Mn(n,2p+t)	⁵⁶ Mn(n,2p+t+a)	⁵⁶ Mn(n,2p+d)								
Reaction #	⁵⁶ Mn(n,2p+d+a)	⁵⁶ Mn(n,3p)	⁵⁶ Mn(n,3p+a)	⁵⁶ Mn(n,3p+2a)								
Reaction #	⁵⁶ Mn(n,3p+t)	⁵⁶ Mn(n,3p+d)	⁵⁶ Mn(n,4p)	⁵⁶ Mn(n,a)								
Reaction #	⁵⁶ Mn(n,a+a)	⁵⁶ Mn(n,a+2a)	⁵⁶ Mn(n,a+3a)	⁵⁶ Mn(n,a+He3)								
Reaction #	⁵⁶ Mn(n,a+He3+a)	⁵⁶ Mn(n,a+He3+2a)	⁵⁶ Mn(n,a+t)	⁵⁶ Mn(n,a+t+a)								
Reaction #	⁵⁶ Mn(n,a+t+2a)	⁵⁶ Mn(n,a+t+He3)	⁵⁶ Mn(n,a+d)	⁵⁶ Mn(n,a+d+a)								
Reaction #	⁵⁶ Mn(n,a+d+2a)	⁵⁶ Mn(n,a+d+He3)	⁵⁶ Mn(n,a+d+He3+a)	⁵⁶ Mn(n,a+d+t)								
Reaction #	⁵⁶ Mn(n,a+d+t+a)	⁵⁶ Mn(n,a+2d)	⁵⁶ Mn(n,a+2d+a)	⁵⁶ Mn(n,a+p)								
Reaction #	⁵⁶ Mn(n,a+p+a)	⁵⁶ Mn(n,a+p+2a)	⁵⁶ Mn(n,a+p+He3)	⁵⁶ Mn(n,a+p+He3+a)								
Reaction #	⁵⁶ Mn(n,a+p+t)	⁵⁶ Mn(n,a+p+t+a)	⁵⁶ Mn(n,a+p+d)	⁵⁶ Mn(n,a+p+d+a)								
Reaction #	⁵⁶ Mn(n,a+p+d+t)	⁵⁶ Mn(n,a+p+2d)	⁵⁶ Mn(n,a+2p)	⁵⁶ Mn(n,a+2p+a)								
Reaction #	⁵⁶ Mn(n,a+2p+2a)	⁵⁶ Mn(n,a+2p+He3)	⁵⁶ Mn(n,a+2p+t)	⁵⁶ Mn(n,a+2p+d)								
Reaction #	⁵⁶ Mn(n,a+2p+d+a)	⁵⁶ Mn(n,a+3p)	⁵⁶ Mn(n,a+3p+a)	⁵⁶ Mn(n,a+4p)								
Reaction #	⁵⁶ Mn(n,2n)	⁵⁶ Mn(n,2n+a)	⁵⁶ Mn(n,2n+2a)	⁵⁶ Mn(n,2n+3a)								
Reaction #	⁵⁶ Mn(n,2n+He3)	⁵⁶ Mn(n,2n+He3+a)	⁵⁶ Mn(n,2n+t)	⁵⁶ Mn(n,2n+t+a)								
Reaction #	⁵⁶ Mn(n,2n+t+2a)	⁵⁶ Mn(n,2n+t+He3)	⁵⁶ Mn(n,2n+d)	⁵⁶ Mn(n,2n+d+a)								
Reaction #	⁵⁶ Mn(n,2n+d+2a)	⁵⁶ Mn(n,2n+d+He3)	⁵⁶ Mn(n,2n+d+t)	⁵⁶ Mn(n,2n+2d)								
Reaction #	⁵⁶ Mn(n,2n+p)	⁵⁶ Mn(n,2n+p+a)	⁵⁶ Mn(n,2n+p+2a)	⁵⁶ Mn(n,2n+p+He3)								
Reaction #	⁵⁶ Mn(n,2n+p+t)	⁵⁶ Mn(n,2n+p+t+a)	⁵⁶ Mn(n,2n+p+d+a)	⁵⁶ Mn(n,2n+p+d+2a)								
Reaction #	⁵⁶ Mn(n,2n+p+d+t)	⁵⁶ Mn(n,2n+p+2d)	⁵⁶ Mn(n,2n+2p)	⁵⁶ Mn(n,2n+2p+a)								
Reaction #	⁵⁶ Mn(n,2n+2p+t)	⁵⁶ Mn(n,2n+2p+d)	⁵⁶ Mn(n,2n+3p)	⁵⁶ Mn(n,2n+3p+a)								
Reaction #	⁵⁶ Mn(n,3n)	⁵⁶ Mn(n,3n+a)	⁵⁶ Mn(n,3n+2a)	⁵⁶ Mn(n,3n+He3)								
Reaction #	⁵⁶ Mn(n,3n+He3+a)	⁵⁶ Mn(n,3n+t)	⁵⁶ Mn(n,3n+t+a)	⁵⁶ Mn(n,3n+d)								
Reaction #	⁵⁶ Mn(n,3n+d+a)	⁵⁶ Mn(n,3n+d+t)	⁵⁶ Mn(n,3n+2d)	⁵⁶ Mn(n,3n+p)								
Reaction #	⁵⁶ Mn(n,3n+p+a)	⁵⁶ Mn(n,3n+p+2a)	⁵⁶ Mn(n,3n+p+He3)	⁵⁶ Mn(n,3n+p+t)								
Reaction #	⁵⁶ Mn(n,3n+p+d)	⁵⁶ Mn(n,3n+2p)	⁵⁶ Mn(n,3n+2p+a)	⁵⁶ Mn(n,3n+2p+d)								
Reaction #	⁵⁶ Mn(n,3n+3p)											

Tabulated residual cross sections						
Reaction #	Mn(n,x) ²⁵ Al	Mn(n,x) ^{26g} Al	Mn(n,x) ^{26(level 01)} Al	Mn(n,x) ²⁶ Al	Mn(n,x) ²⁷ Al	Mn(n,x) ²⁸ Al
Reaction #	Mn(n,x) ²⁹ Al	Mn(n,x) ³⁰ Al	Mn(n,x) ³¹ Al	Mn(n,x) ³² Al	Mn(n,x) ³³ Al	Mn(n,x) ³⁴ Al
Reaction #	Mn(n,x) ³⁵ Al	Mn(n,x) ³⁶ Al	Mn(n,x) ³⁷ Al	Mn(n,x) ²⁶ Si	Mn(n,x) ²⁷ Si	Mn(n,x) ²⁸ Si
Reaction #	Mn(n,x) ²⁹ Si	Mn(n,x) ³⁰ Si	Mn(n,x) ³¹ Si	Mn(n,x) ³² Si	Mn(n,x) ³³ Si	Mn(n,x) ³⁴ Si
Reaction #	Mn(n,x) ³⁵ Si	Mn(n,x) ³⁶ Si	Mn(n,x) ³⁷ Si	Mn(n,x) ³⁸ Si	Mn(n,x) ³⁹ Si	Mn(n,x) ⁴⁰ Si
Reaction #	Mn(n,x) ²⁸ P	Mn(n,x) ²⁹ P	Mn(n,x) ³⁰ P	Mn(n,x) ³¹ P	Mn(n,x) ³² P	Mn(n,x) ³³ P
Reaction #	Mn(n,x) ³⁴ P	Mn(n,x) ³⁵ P	Mn(n,x) ³⁶ P	Mn(n,x) ³⁷ P	Mn(n,x) ³⁸ P	Mn(n,x) ³⁹ P
Reaction #	Mn(n,x) ⁴⁰ P	Mn(n,x) ⁴¹ P	Mn(n,x) ⁴² P	Mn(n,x) ⁴³ P	Mn(n,x) ³⁰ S	Mn(n,x) ³¹ S
Reaction #	Mn(n,x) ³² S	Mn(n,x) ³³ S	Mn(n,x) ³⁴ S	Mn(n,x) ³⁵ S	Mn(n,x) ³⁶ S	Mn(n,x) ³⁷ S
Reaction #	Mn(n,x) ³⁸ S	Mn(n,x) ³⁹ S	Mn(n,x) ⁴⁰ S	Mn(n,x) ⁴¹ S	Mn(n,x) ⁴² S	Mn(n,x) ⁴³ S
Reaction #	Mn(n,x) ⁴⁴ S	Mn(n,x) ⁴⁵ S	Mn(n,x) ³¹ Cl	Mn(n,x) ³² Cl	Mn(n,x) ³³ Cl	Mn(n,x) ^{34g} Cl
Reaction #	Mn(n,x) ^{38(level 01)} Cl	Mn(n,x) ³⁴ Cl	Mn(n,x) ³⁵ Cl	Mn(n,x) ³⁶ Cl	Mn(n,x) ³⁷ Cl	Mn(n,x) ^{38g} Cl
Reaction #	Mn(n,x) ^{38(level 01)} Cl	Mn(n,x) ³⁸ Cl	Mn(n,x) ³⁹ Cl	Mn(n,x) ⁴⁰ Cl	Mn(n,x) ⁴¹ Cl	Mn(n,x) ⁴² Cl
Reaction #	Mn(n,x) ⁴³ Cl	Mn(n,x) ⁴⁴ Cl	Mn(n,x) ⁴⁵ Cl	Mn(n,x) ⁴⁶ Cl	Mn(n,x) ⁴⁷ Cl	Mn(n,x) ⁴⁸ Cl
Reaction #	Mn(n,x) ³³ Ar	Mn(n,x) ³⁴ Ar	Mn(n,x) ³⁵ Ar	Mn(n,x) ³⁶ Ar	Mn(n,x) ³⁷ Ar	Mn(n,x) ³⁸ Ar
Reaction #	Mn(n,x) ³⁹ Ar	Mn(n,x) ⁴⁰ Ar	Mn(n,x) ⁴¹ Ar	Mn(n,x) ⁴² Ar	Mn(n,x) ⁴³ Ar	Mn(n,x) ⁴⁴ Ar
Reaction #	Mn(n,x) ⁴⁵ Ar	Mn(n,x) ⁴⁶ Ar	Mn(n,x) ⁴⁷ Ar	Mn(n,x) ⁴⁸ Ar	Mn(n,x) ⁴⁹ Ar	Mn(n,x) ⁵⁰ Ar
Reaction #	Mn(n,x) ³⁵ K	Mn(n,x) ³⁶ K	Mn(n,x) ³⁷ K	Mn(n,x) ^{38g} K	Mn(n,x) ^{38(level 01)} K	Mn(n,x) ³⁸ K
Reaction #	Mn(n,x) ³⁹ K	Mn(n,x) ⁴⁰ K	Mn(n,x) ⁴¹ K	Mn(n,x) ⁴² K	Mn(n,x) ⁴³ K	Mn(n,x) ⁴⁴ K
Reaction #	Mn(n,x) ⁴⁵ K	Mn(n,x) ⁴⁶ K	Mn(n,x) ⁴⁷ K	Mn(n,x) ⁴⁸ K	Mn(n,x) ⁴⁹ K	Mn(n,x) ⁵⁰ K
Reaction #	Mn(n,x) ⁵¹ K	Mn(n,x) ³⁶ Ca	Mn(n,x) ³⁷ Ca	Mn(n,x) ³⁸ Ca	Mn(n,x) ³⁹ Ca	Mn(n,x) ⁴⁰ Ca
Reaction #	Mn(n,x) ⁴¹ Ca	Mn(n,x) ⁴² Ca	Mn(n,x) ⁴³ Ca	Mn(n,x) ⁴⁴ Ca	Mn(n,x) ⁴⁵ Ca	Mn(n,x) ⁴⁶ Ca
Reaction #	Mn(n,x) ⁴⁷ Ca	Mn(n,x) ⁴⁸ Ca	Mn(n,x) ⁴⁹ Ca	Mn(n,x) ⁵⁰ Ca	Mn(n,x) ⁵¹ Ca	Mn(n,x) ⁵² Ca
Reaction #	Mn(n,x) ³⁸ Sc	Mn(n,x) ³⁹ Sc	Mn(n,x) ⁴⁰ Sc	Mn(n,x) ⁴¹ Sc	Mn(n,x) ^{42g} Sc	Mn(n,x) ^{42(level 02)} Sc
Reaction #	Mn(n,x) ⁴² Sc	Mn(n,x) ⁴³ Sc	Mn(n,x) ^{44g} Sc	Mn(n,x) ^{44(level 04)} Sc	Mn(n,x) ⁴⁴ Sc	Mn(n,x) ^{45g} Sc
Reaction #	Mn(n,x) ^{45(level 01)} Sc	Mn(n,x) ⁴⁵ Sc	Mn(n,x) ^{46g} Sc	Mn(n,x) ^{46(level 02)} Sc	Mn(n,x) ⁴⁶ Sc	Mn(n,x) ⁴⁷ Sc
Reaction #	Mn(n,x) ⁴⁸ Sc	Mn(n,x) ⁴⁹ Sc	Mn(n,x) ^{50g} Sc	Mn(n,x) ^{50(level 01)} Sc	Mn(n,x) ⁵⁰ Sc	Mn(n,x) ⁵¹ Sc
Reaction #	Mn(n,x) ⁵² Sc	Mn(n,x) ⁵³ Sc	Mn(n,x) ⁴⁰ Ti	Mn(n,x) ⁴¹ Ti	Mn(n,x) ⁴² Ti	Mn(n,x) ⁴³ Ti
Reaction #	Mn(n,x) ⁴⁴ Ti	Mn(n,x) ⁴⁵ Ti	Mn(n,x) ⁴⁶ Ti	Mn(n,x) ⁴⁷ Ti	Mn(n,x) ⁴⁸ Ti	Mn(n,x) ⁴⁹ Ti
Reaction #	Mn(n,x) ⁵⁰ Ti	Mn(n,x) ⁵¹ Ti	Mn(n,x) ⁵² Ti	Mn(n,x) ⁵³ Ti	Mn(n,x) ⁵⁴ Ti	Mn(n,x) ⁴² V
Reaction #	Mn(n,x) ⁴³ V	Mn(n,x) ⁴⁴ V	Mn(n,x) ⁴⁵ V	Mn(n,x) ⁴⁶ V	Mn(n,x) ⁴⁷ V	Mn(n,x) ⁴⁸ V
Reaction #	Mn(n,x) ⁴⁹ V	Mn(n,x) ⁵⁰ V	Mn(n,x) ⁵¹ V	Mn(n,x) ⁵² V	Mn(n,x) ⁵³ V	Mn(n,x) ⁵⁴ V
Reaction #	Mn(n,x) ⁵⁵ V	Mn(n,x) ⁴³ Cr	Mn(n,x) ⁴⁴ Cr	Mn(n,x) ⁴⁵ Cr	Mn(n,x) ⁴⁶ Cr	Mn(n,x) ⁴⁷ Cr
Reaction #	Mn(n,x) ⁴⁸ Cr	Mn(n,x) ⁴⁹ Cr	Mn(n,x) ⁵⁰ Cr	Mn(n,x) ⁵¹ Cr	Mn(n,x) ⁵² Cr	Mn(n,x) ⁵³ Cr
Reaction #	Mn(n,x) ⁵⁴ Cr	Mn(n,x) ⁵⁵ Cr	Mn(n,x) ⁵⁶ Cr	Mn(n,x) ⁴⁵ Mn	Mn(n,x) ⁴⁶ Mn	Mn(n,x) ⁴⁷ Mn
Reaction #	Mn(n,x) ⁴⁸ Mn	Mn(n,x) ⁴⁹ Mn	Mn(n,x) ^{50g} Mn	Mn(n,x) ^{50(level 01)} Mn	Mn(n,x) ⁵⁰ Mn	Mn(n,x) ⁵¹ Mn
Reaction #	Mn(n,x) ^{52g} Mn	Mn(n,x) ^{52(level 01)} Mn	Mn(n,x) ⁵² Mn	Mn(n,x) ⁵³ Mn	Mn(n,x) ⁵⁴ Mn	Mn(n,x) ⁵⁵ Mn
Reaction #	Mn(n,x) ⁵⁶ Mn	Mn(n,x) ⁵⁷ Mn				

YANDF-0.4

TALYS 2.24 output file: nnang.L01

‘#’ for direct use in various software,
e.g. Gnuplot

Without ‘#’: YAML 2 spaces
indentation per level

Parsing to JSON should be easy

Only **5 main attributes for nuclear reactions**

TALYS: 2 main attributes:
‘parameters’ and ‘observables’

EXFOR: all specific metadata after
the data block

```
# header:
# title: Li7(n,g_1) angular distribution at 1.000000E+00 MeV
# source: TALYS-2.24
# user: Unknown User
# date: 2026-10-10
# format: YANDF-0.4
# target:
# Z: 3
# A: 7
# nuclide: Li7
# reaction:
# type: (n,g_1)
# ENDF_MF: 4
# ENDF_MT: 102
# E-incident [MeV]: 1.000000E+00
# level:
#   number: 1
#   energy [MeV]: 9.808000E-01
#   spin: 1.000000E+00
#   parity: 1
# quantity:
#   type: angular distribution
# datablock:
#   columns: 4
#   entries: 91
##   Angle          xs          Direct          Compound
##   [deg]         [mb/sr]       [mb/sr]         [mb/sr]
0.000000E+00 2.039746E-05 0.000000E+00 2.039746E-05
2.000000E+00 2.039588E-05 0.000000E+00 2.039588E-05
4.000000E+00 2.039113E-05 0.000000E+00 2.039113E-05
```

TALYS-2.24 /Work

Where? <https://tendl.imperial.ac.uk>

<https://tendl.imperial.ac.uk>

TENDL-2008
TENDL-2009
TENDL-2010
TENDL-2012
TENDL-2014
TENDL-2015
TENDL-2017
TENDL-2019
TENDL-2021
TENDL-2023
TENDL-2025

Index of /public/download-endf/TENDL-2014

Name	Last modified	Size	Description
Parent Directory		-	
d/	2016-09-22 12:32	-	
g/	2016-09-22 12:42	-	
he3/	2016-09-22 12:53	-	
he4/	2016-09-22 13:02	-	
n/	2016-09-22 13:26	-	
p/	2016-09-22 13:36	-	
t/	2016-09-22 13:46	-	
000-NSUB-index.htm	2016-09-22 12:18	1.2K	
d-index.htm	2016-09-22 10:38	414K	
g-index.htm	2016-09-22 07:40	414K	
he3-index.htm	2016-09-22 11:54	430K	
he4-index.htm	2016-09-22 12:18	431K	
n-index.htm	2016-09-22 09:30	414K	
p-index.htm	2016-09-22 10:01	414K	
t-index.htm	2016-09-22 11:17	414K	

Up to 2014, limited forms

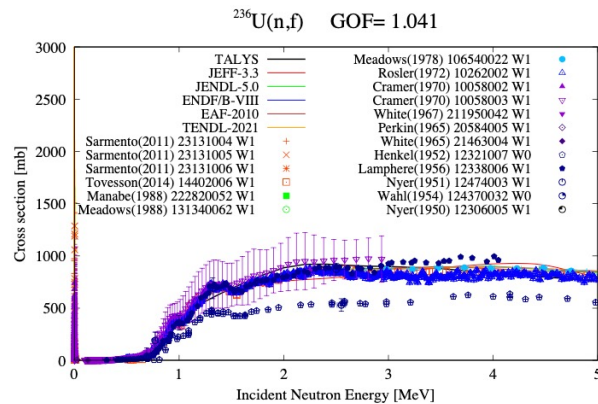
Now live: **09/02/2026**

All TENDL's in the same place

How? TALYS-2.2 coded input parameters & GOF

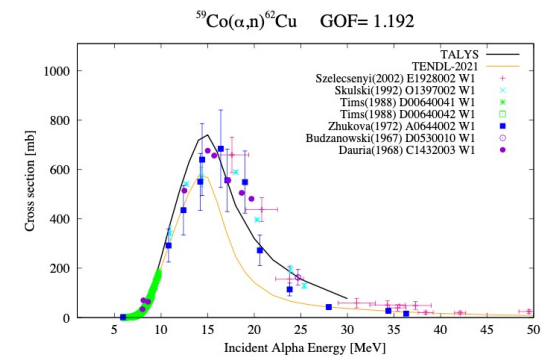
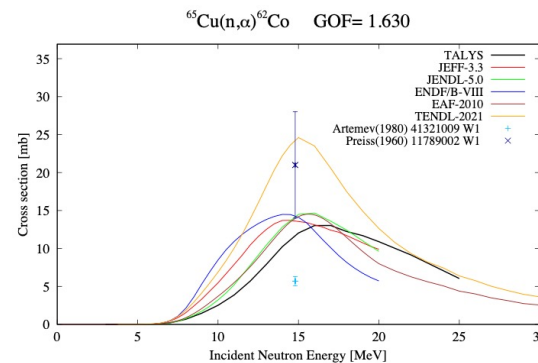
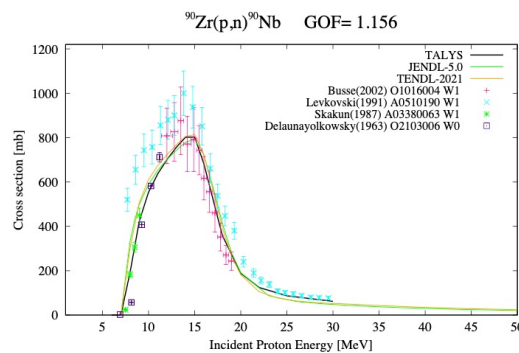
Optimized parameters

Weight allocation on exp.



Reaction	Nuclides	IP	IP	IP	IP	IP	IP
(n, γ)	278	wtable					
(n,f)	34	vfiscor	betafiscor	ctable(1)	ptable(1)	ctable(2)	ptable(2)
(n,n';2n;p)	210	rv(p)	$g_{ph}(0)$	$g_{ph}(n)$	ctable(n)	ctable(p)	
(n, α)	157	rv(α)	Cstrip(α)	$g_{ph}(0)$	ctable(α)		
(p,n)	142	rv(p)	rwd(p)	rv(n)	$g_{ph}(0)$	$g_{ph}(n)$	ctable(n)
(γ ,n)	77	wtable	ftable	etable			
(α ,n)	93	rv(α)	rwd(α)	rv(n)	$g_{ph}(0)$	ctable(α)	
(d,n)	40	rv(p)	rwd(p)	rv(n)	$g_{ph}(0)$	$g_{ph}(n)$	ctable(n)

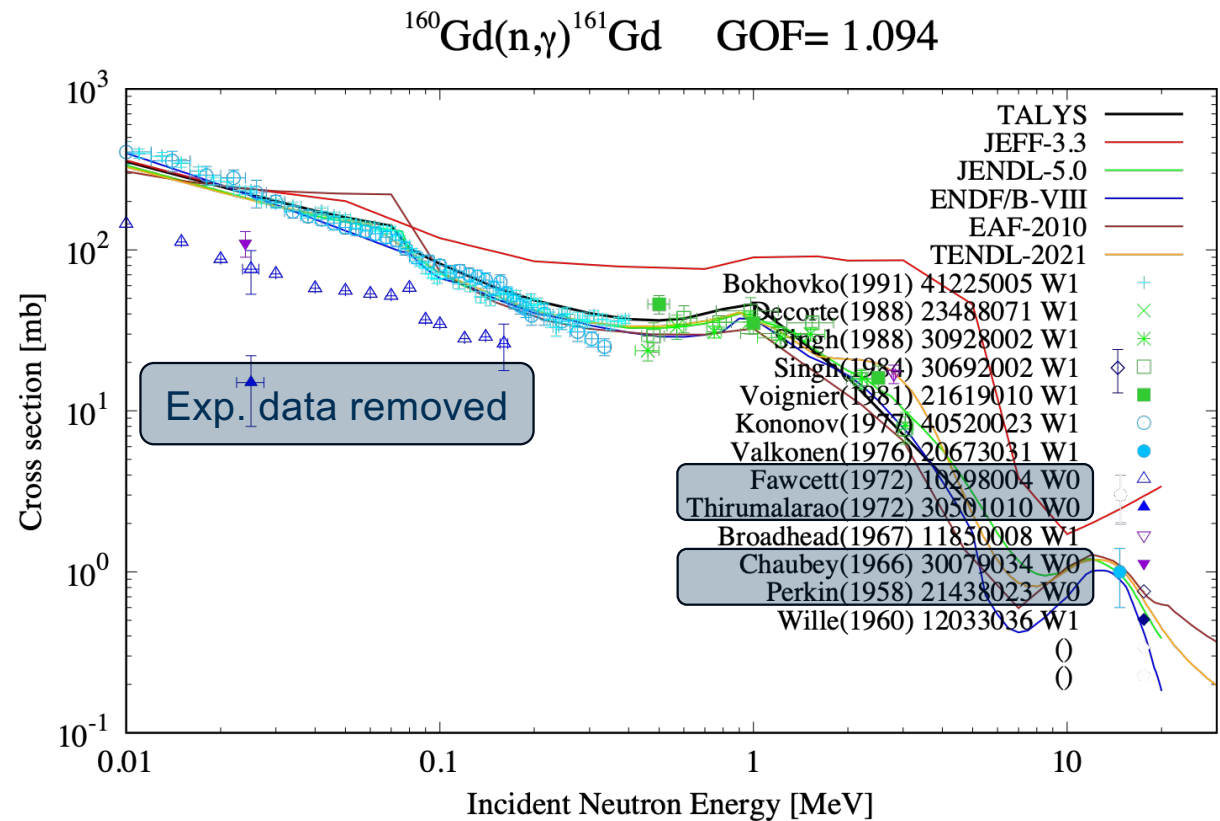
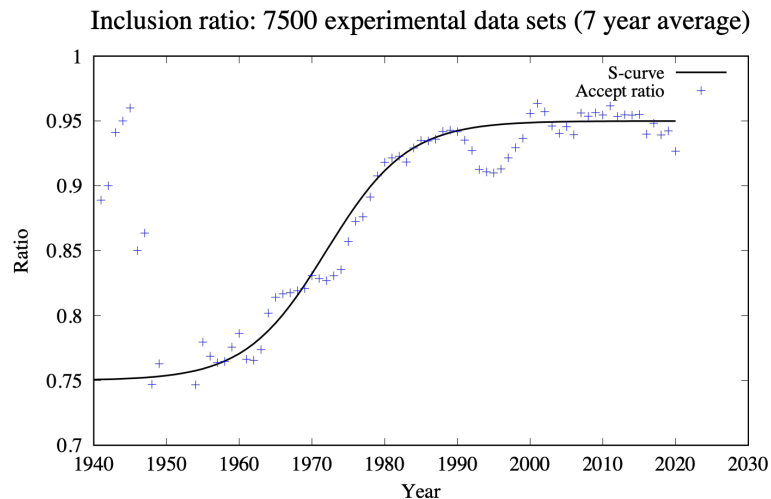
GOF value
How good is
the fit?



How? TALYS-2.2 coded input parameters & GOF

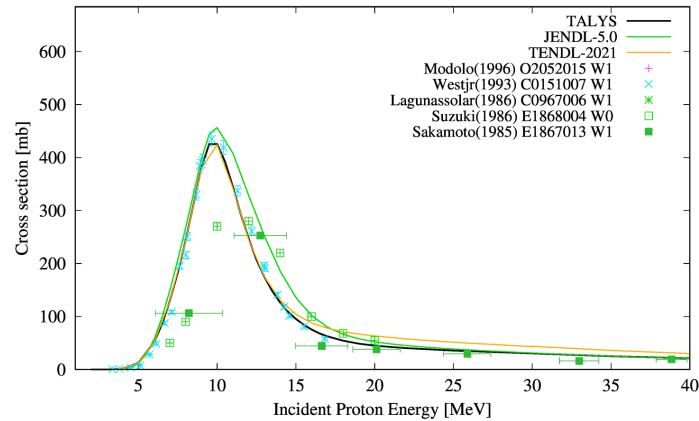
Outlier assignment (W0) and optimised TALYS model parameters per nuclide and reaction channel

7500 experiments, age weighted,
subjective, but..

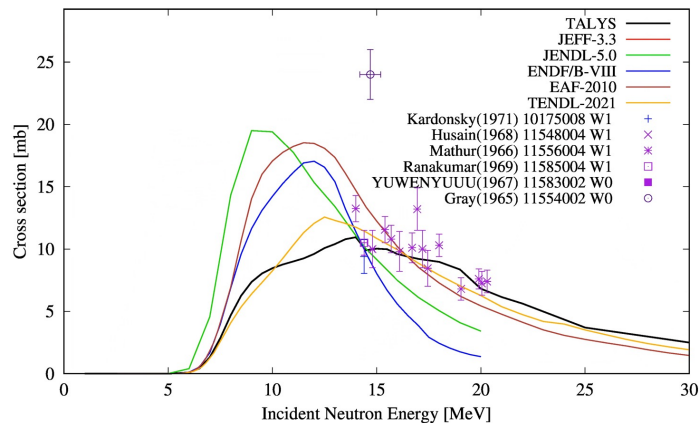


How? Scouting the experimental nuclear landscapes

$^{127}\text{I}(\text{p},\text{n})^{127}\text{Xe}$ GOF= 1.33

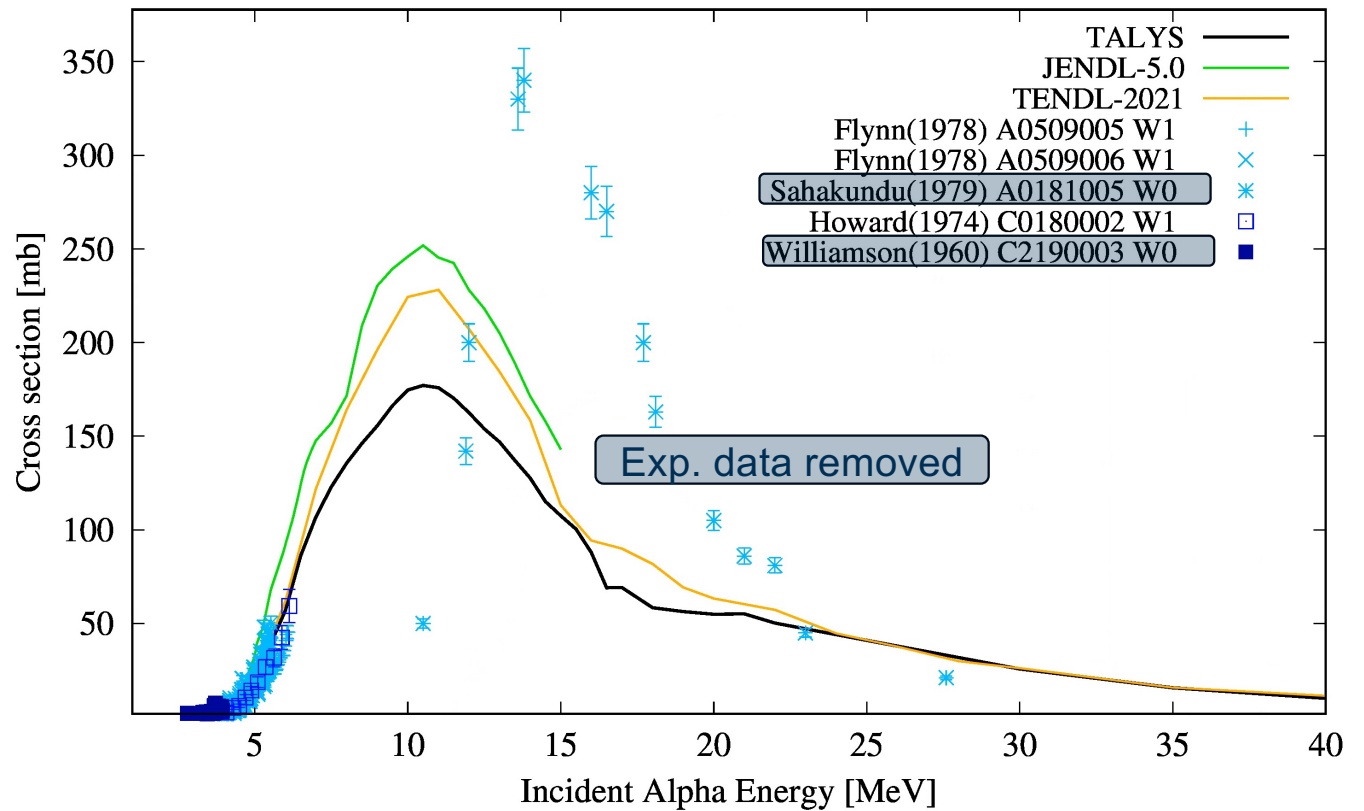


$^{40}\text{Ar}(\text{n},\alpha)^{37}\text{S}$ GOF= 1.05



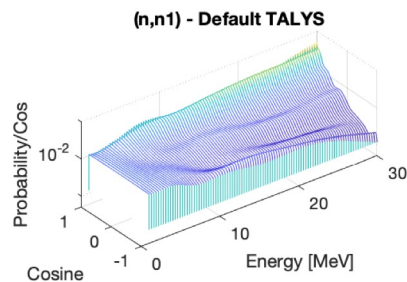
$(\alpha,\text{n}), (\text{n},\alpha)$ and (p,n) films

$^{27}\text{Al}(\alpha,\text{n})^{30}\text{P}$ GOF= 1.31

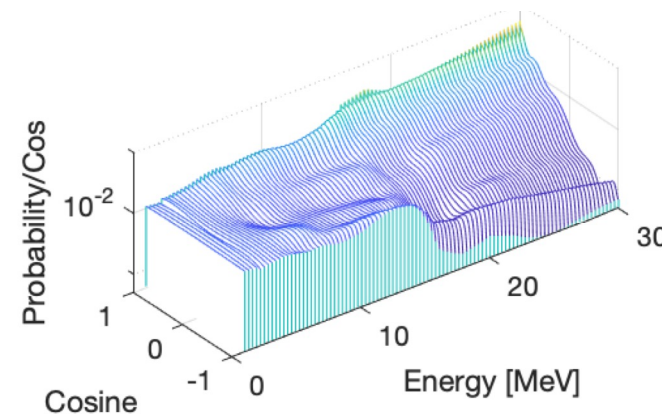


UK Atomic
Energy
Authority

■ ■ ■

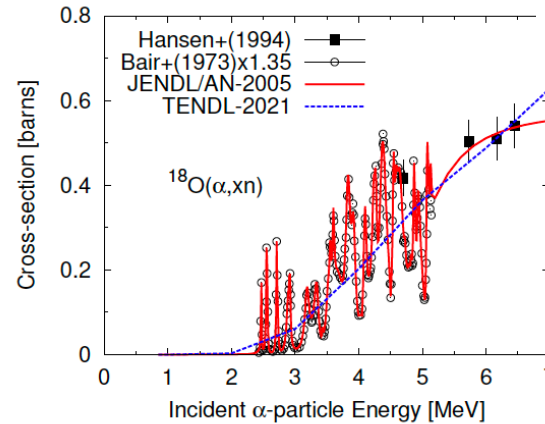
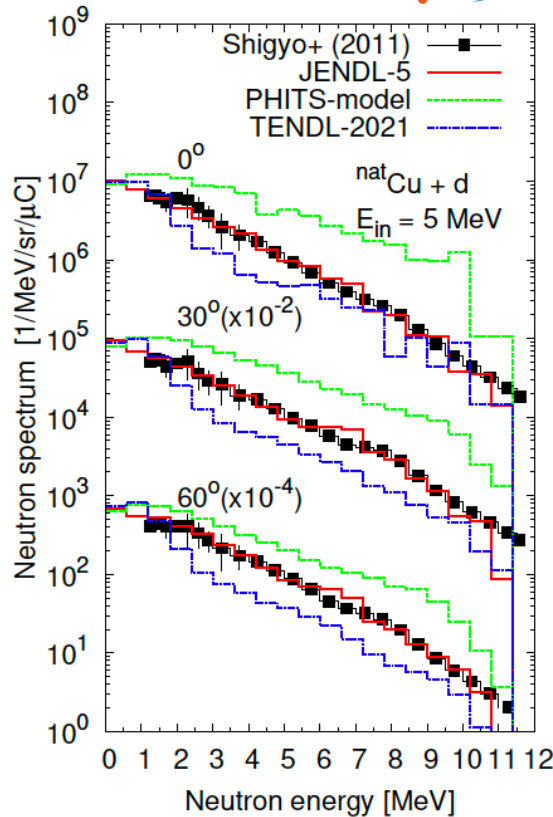


```
#
# General
#
ldmodel 2
#
# (n,tot), (n,el), (n,inl)
#
awdadjust n 1. awdadjust-n.table
#
# (n,p), (n,2n), (n,np)
#
rvadjust p 0.99
avadjust p 0.99
gnadjust 26 57 0.90
gpadjust 26 57 0.90
aadjust 25 56 1.12
pshiftadjust 26 56 -0.2
pshiftadjust 25 56 0.1
#
# (n,a)
#
cknock a 1.1
cstrip a 1.1
#
# (n,g)
ldmodelCN 1
#
# Other: Isomers, (n,d), (n,t), (n,h) etc.
#
***** T A L Y S *****
```

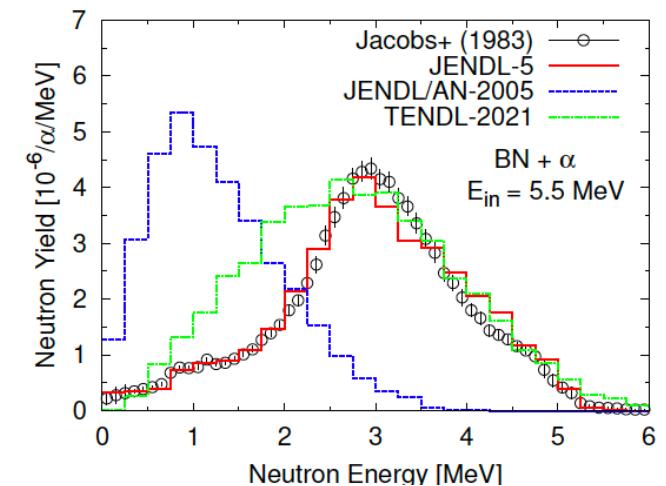
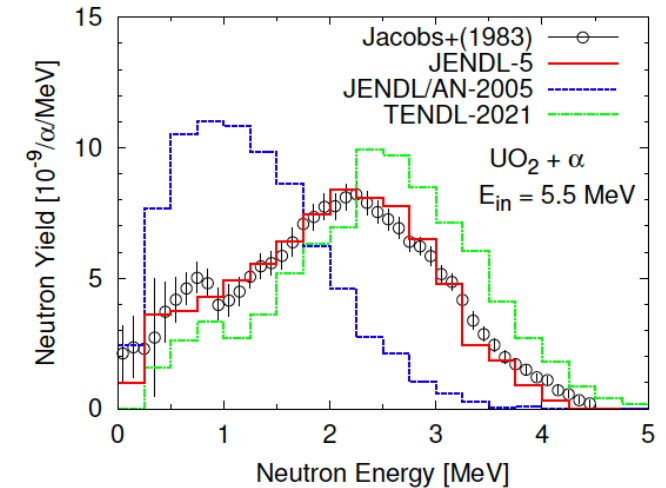
[illegible]

Verification & Validation - deuteron and alpha induced libraries

5 MeV deuteron on thick Copper

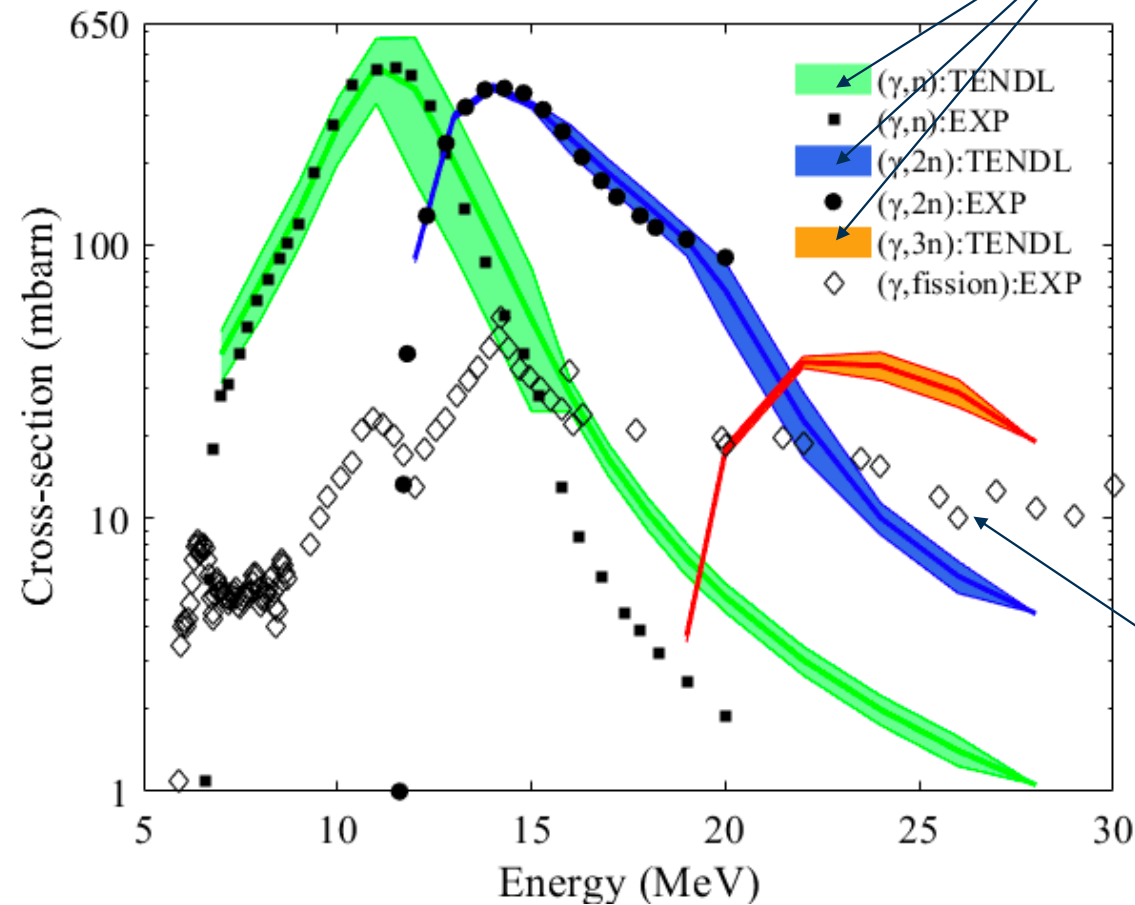


- 5.5 MeV alpha on UO₂ and Boron nitride
- Better than JENDL/AN-2005 but then a-JENDL-5 arrived !!



Verification & Validation processes - gamma induced libraries

- Gamma on ^{232}Th



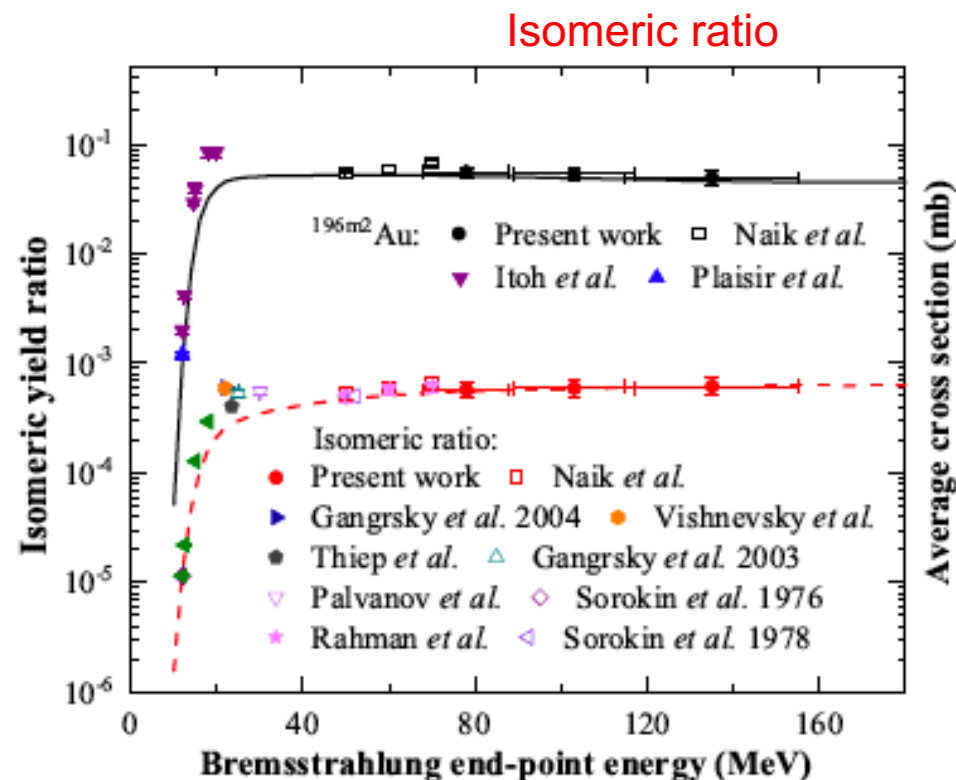
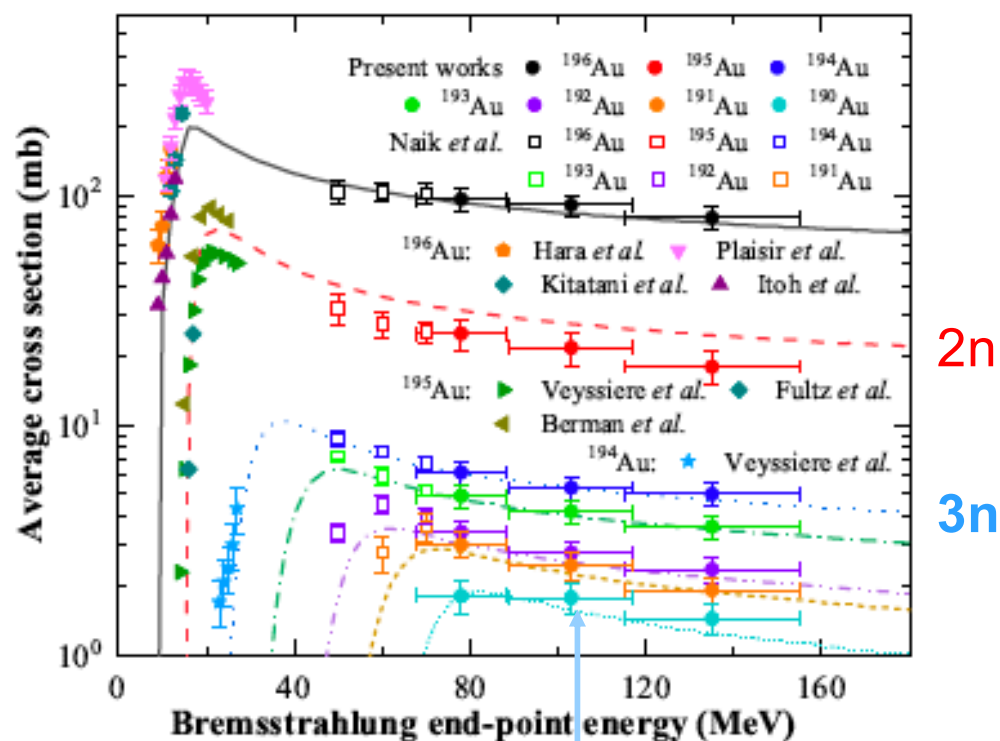
variance



TALYS-2.2 blind simulation,
no exp. fitting !!

Caveat: γ -fission in MF-10

Laser-driven Ultra-Bright Ultra-Fast Bremsstrahlung g-Ray



7n TALYS-2.2

Conclusions

Nuclear model codes & libraries will always require an improvement of

- Optical model and direct reactions
- Level densities
- Photon strength functions
- Fission events
- Pre-equilibrium mechanism
- Compound nucleus model
- Always need: **curated** experimental data EXFOR
- **C**ontinuous **I**ntegration – **V**erification and **V**alidation processes

Future (the day after tomorrow with AI):

- A modular nuclear model code made by “**united**” **scientific** communities
- Nuclear model code simulators using **D**ata **L**earning, **A**rtificial **I**ntelligence agents
- Direct feeding of probability tables “event generator style” to simulation code
- **Autotalys** with the help of ChatGPT/Codex & Anthropic/Claude

Next chapter: the making of TENDL-2027