EXFOR-C5: recent development, versions, distribution

by Viktor Zerkin
~ independent software developer ~

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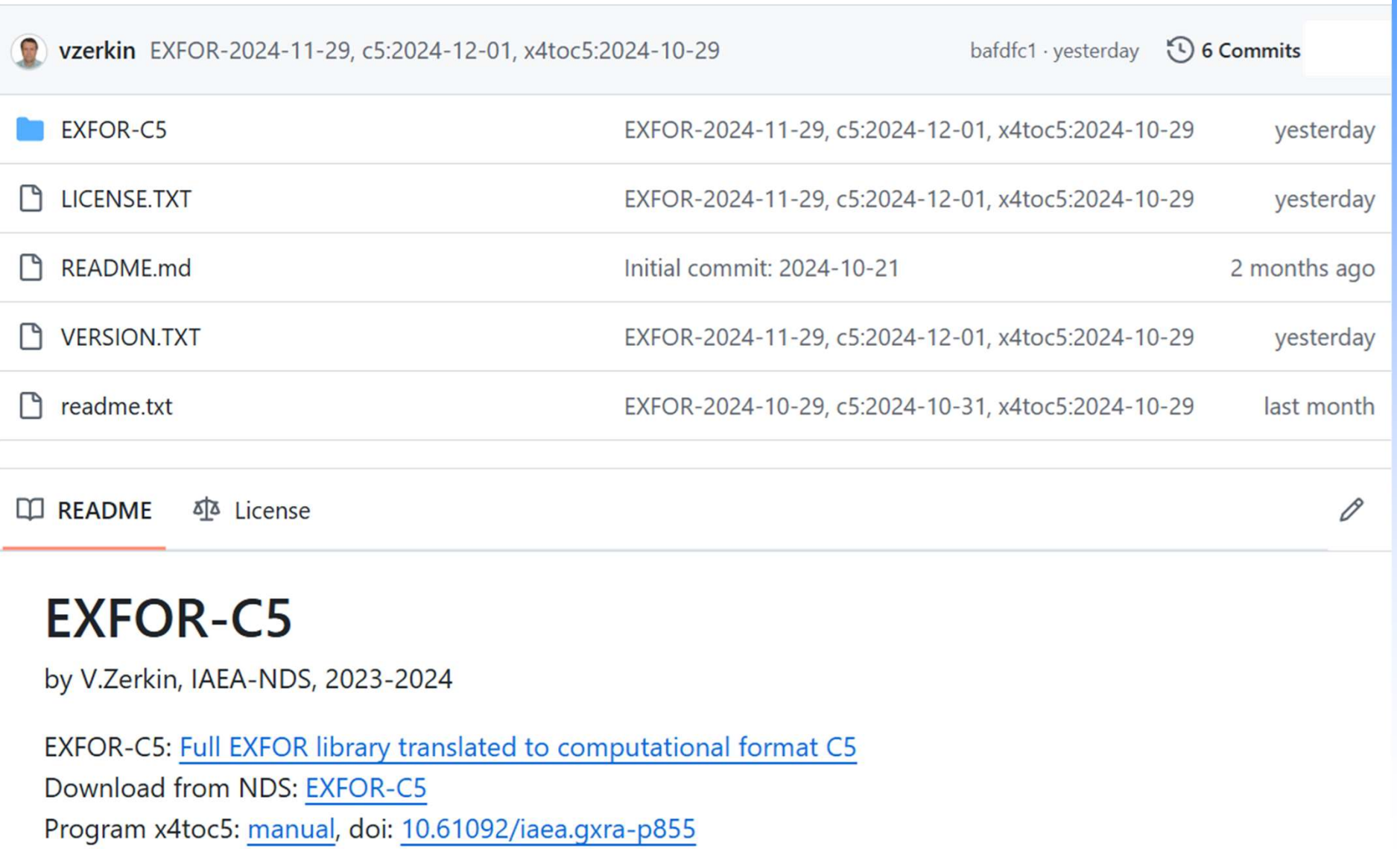
Repository on GitHub

https://github.com/vzerkin/EXFOR-C5



Versions

https://github.com/vzerkin/EXFOR-C5

1. Data versions: *full EXFOR translated to C5*
   - *C5v0* *converted incident energy from C.M. to Lab.*
     converted Rutherford-Ratio to B/SR (MF4)
   - *C5v1* *options from EXFOR-C5v0 +*
     datasets with unknown MT are included (MF>0, MT=0)
   - *C5v2* *options from EXFOR-C5v0 +*
     angle and data: C.M. to Lab. (for MT4)
     replaced Q-Value by E-Level
     reset MT51, MT601, by MT+iLevel (for partial reactions)
     sort data: CS(EN), DA(EN:AN), DE(EN,E2), DAE(EN:AN:E2)
   - *C5v3* *options from EXFOR-C5v2 +*
     auto-renormalized using modern monitor CS data
   - *C5v4* *options from EXFOR-C5v3 +*
     auto-renormalized using modern Decay-data
   - *C5v5* *options from EXFOR-C5v4 +*
     generated correlation matrix (DOI:10.1051/epjconf/20122700009)
   - *C5v6* *options from EXFOR-C5v4 +* *New (2024)*
     convert CS-ratio:MF203 to CS:MT3 (if "recommended" data of reaction-denominator exist)

2. Index: CSV and JSON files with index of Entries and Datasets

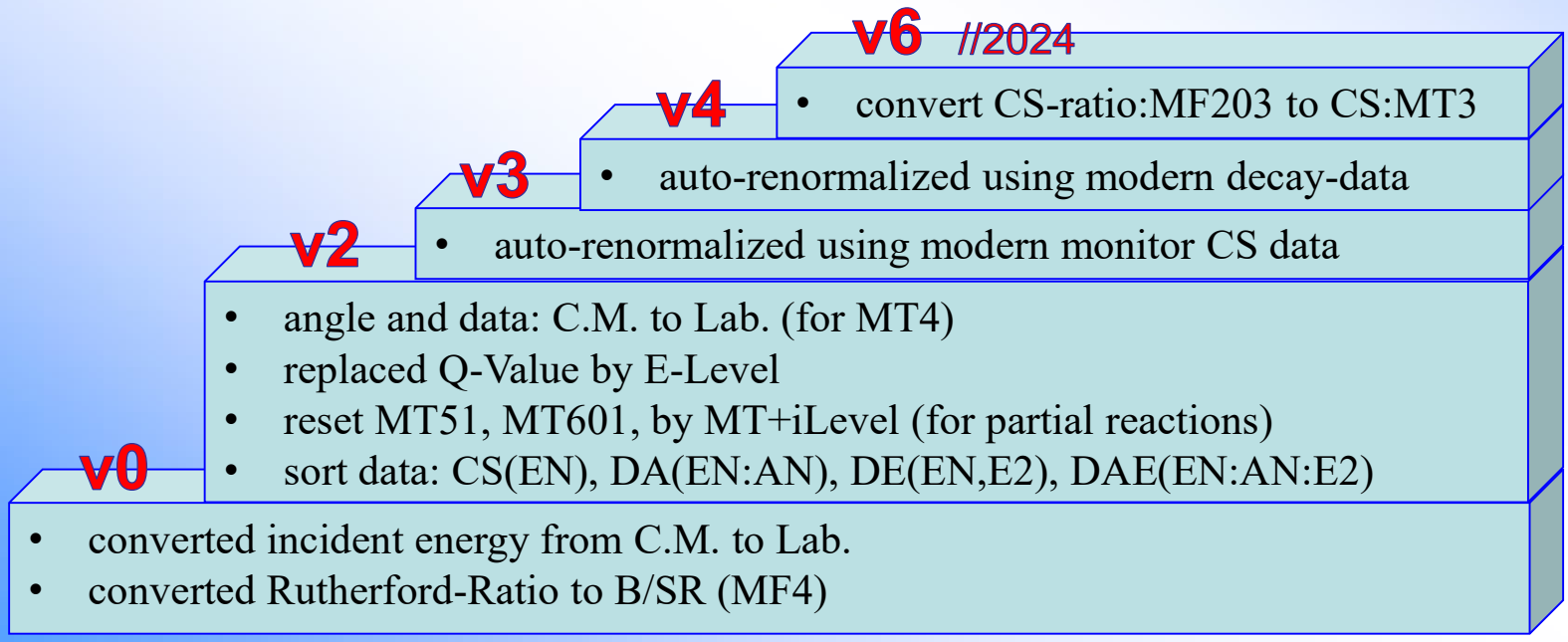
3. Python codes: for indexing, search, retrieval and plotting original and automatically renormalized data

4. Bash scripts: producing single C5 file, compatible with XC4 distribution 2007-2022

Data source. Versions.

Data source:

1.	EXFOR Master file:	2024-11-29 International Network of Nuclear Reaction Data Centres (NRDC)
2.	EXFOR Dictionaries:	2024-06-27 NRDC, V.McLane(NNDC), O.Schwerer(IAEA), N.Otsuka(IAEA)
3.	X4TOC4:MF/MT dictionary:	2021-04-26 D.Cullen(IAEA), A.Trkov(IAEA), V.Zerkin(IAEA), Empire-team
4.	X4SF:MF/MT/LR dictionary:	2022-04-22 V.Pronyaev(IAEA,IPPE)
5.	Archive of monitors CS:	2024-10-28 K.Zolotarev(IPPE), V.Zerkin(IAEA)
6.	Reference cross sections:	2020-10-02 IAEA-CRP: Neutron Data Standards, IRDFF: International Reactor Dosimetry & Fusion File
7.	Decay-data/ENSDF-LARA:	2024-10-16 NSDD, M.Verpelli(IAEA)
8.	Nuclear levels/RIPL:	2022-05-31 IAEA Reference Input Parameter Library



Version-4. Correction summary

File: c5corr-v4.lst Corrected datasets: 11,215

#Flag	DatasetID	Fc:Ave	MONIT:Ave	DECAY-DATA	DECAY-MON
#/C5CORR	10022002	0.946998	0.944362	1.00279	-
#/C5CORR	10022003	0.938824	0.944362	0.994136	-
#/C5CORR	10022004	0.944362	0.944362	-	-
#/C5CORR	10022010	0.945795	0.944362	1.00152	-
#/C5CORR	10022011	0.944362	0.944362	-	-
#/C5CORR	10022012	0.959807	0.944362	1.01636	-
#/C5CORR	10022013	0.940088	0.944362	0.995475	-
#/C5CORR	10022014	0.944362	0.944362	-	-
#/C5CORR	10022015	1.01948	0.944362	1.07955	-
#/C5CORR	10022016	0.944362	0.944362	-	-
#/C5CORR	10022017	1.01948	0.944362	1.07955	-
#/C5CORR	10022018	0.944362	0.944362	-	-
#/C5CORR	10022019	0.901918	0.944362	0.955056	-
#/C5CORR	10022020	1.03176	0.944362	1.09255	-
		. . . . .			
#/C5CORR	21004005	0.953926	0.969596	0.998745	0.985075
#/C5CORR	21004006	0.955125	0.969596	-	0.985075
		. . . . .			

Translation Summary

EXFOR VERSION	2024-11-29	
ENTRY	26399	
SUBENT	169771	
DATASETS	184726	
DATA POINTS	20363565	
TRANSLATED ENTRY	21001	79.6%
TRANSLATED SUBENT	128577	75.7%
TRANSLATED DATASETS	141206	76.4%
TRANSLATED DATA POINTS	11696286	57.4%

V4-Statistics:

```
70,791 #MF:3
28,911 #MF:4
 9,840 #MF:402
 7,651 #MF:6
 3,180 #MF:203
 2,499 #MF:2
 2,450 #MF:213
 1,945 #MF:104
 1,651 #MF:606
 1,411 #MF:5
 1,308 #MF:801
 1,227 #MF:403
 1,203 #MF:8
 1,094 #MF:154
   939 #MF:1
   776 #MF:7
   672 #MF:13
   484 #MF:604
   424 #MF:208
   326 #MF:405
   297 #MF:802
   259 #MF:14
   249 #MF:204
   248 #MF:603
   230 #MF:608
   177 #MF:401
   167 #MF:223
   151 #MF:201
    97 #MF:53
    82 #MF:206
    77 #MF:15
    51 #MF:601
    46 #MF:613
    46 #MF:602
    42 #MF:614
    40 #MF:803
```

V6-Statistics:

```
71,703 #MF:3
28,911 #MF:4
 9,840 #MF:402
 7,651 #MF:6
 2,499 #MF:2
 2,450 #MF:213
 2,268 #MF:203
 1,945 #MF:104
 . . . . .
```

Version-6, 2024-12-02

V4 - V6 Parameters:

1. convert C.M. to Lab.
2. convert Rutherford-Ratio to B/SR
3. replace Q-Value by E-Level (for partial reactions)
4. replace MT by MT+iLevel (for MT:51,601,651,701,751,801)
5. renormalize using modern monitor cross sections data
6. renormalize using modern decay data
   1) decay-corr-factor limitation: 0.6 - 1.667
   2) search nearest g-line within: 3.0 keV
   3) ignoring negligible correction: diff<0.1%
7. sort C5 file
8. convert CS-ratio:MF203 to CS:MT3 using modern monitor data

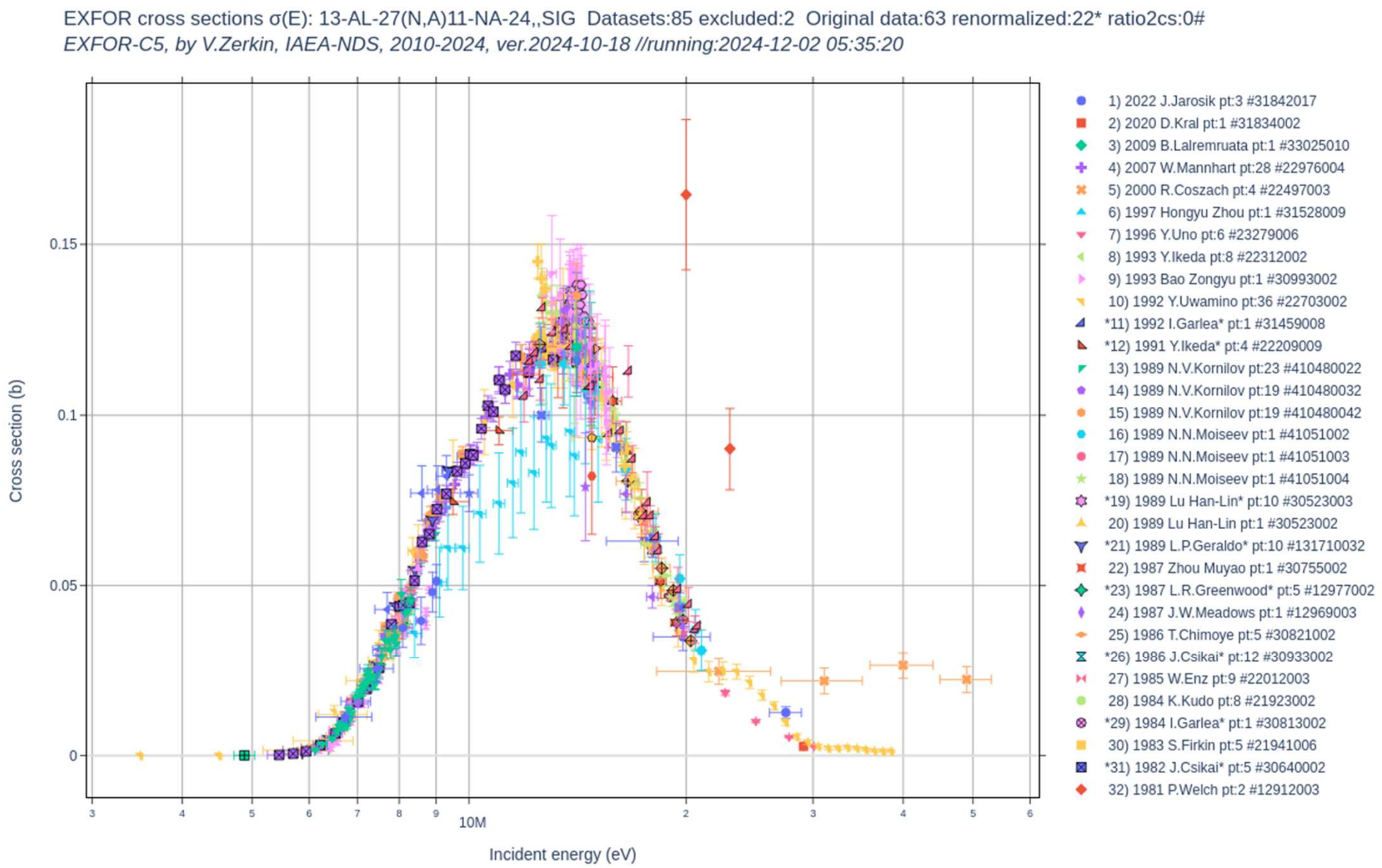
V4 → V6

```
MF3:    70,791 +912 = 71,703 Datasets +1.3%
MF203:   3,180 -912 =  2,268 Datasets -28.7%
```

Test-1 by plotting code c5data1.py

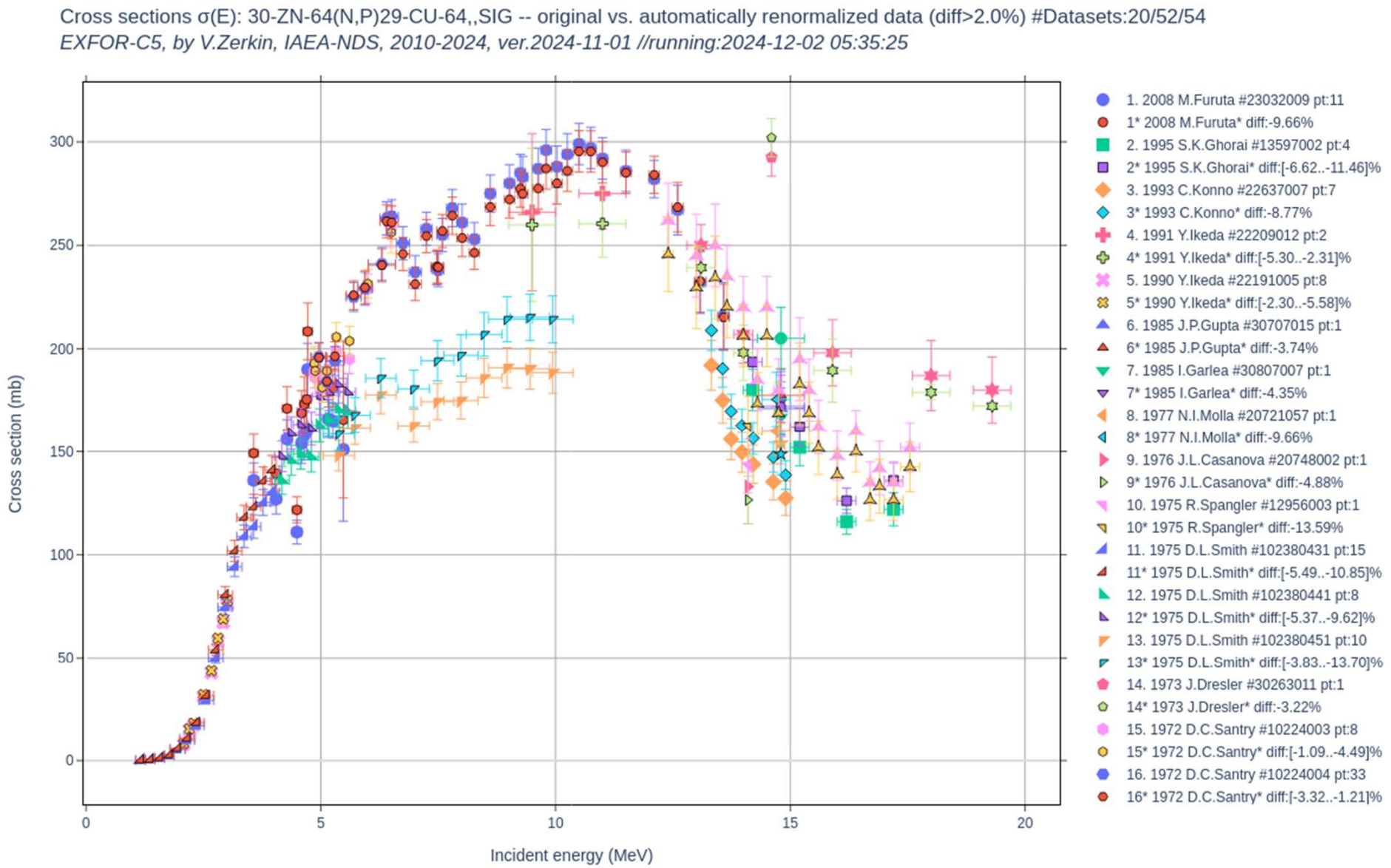
Runs in every version. Plotly → html + png

13-AL-27(N,A)11-NA-24,,SIG
V4. Original data: 63 datasets
Renormalized: 22 datasets



Test-2 by code c5data2.py: renormalized data.

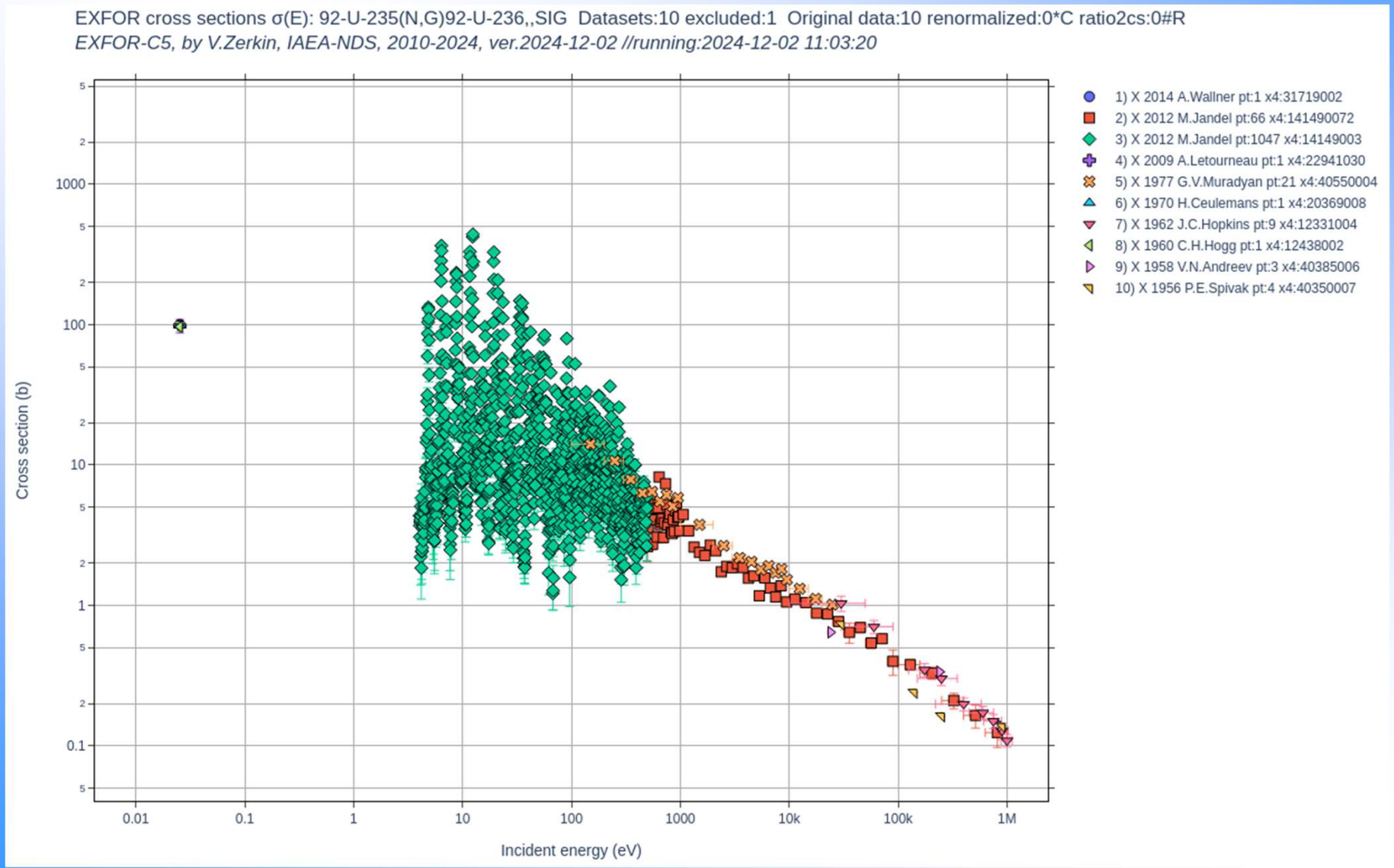
30-ZN-64(N,P)29-CU-64,,SIG



c5data3.py: V0-V5. Original data.

Reaction: 92-U-235(N,G)92-U-236,,SIG

Original data: 10 datasets



c5data3.py: V6. Original data + Ratios2CS

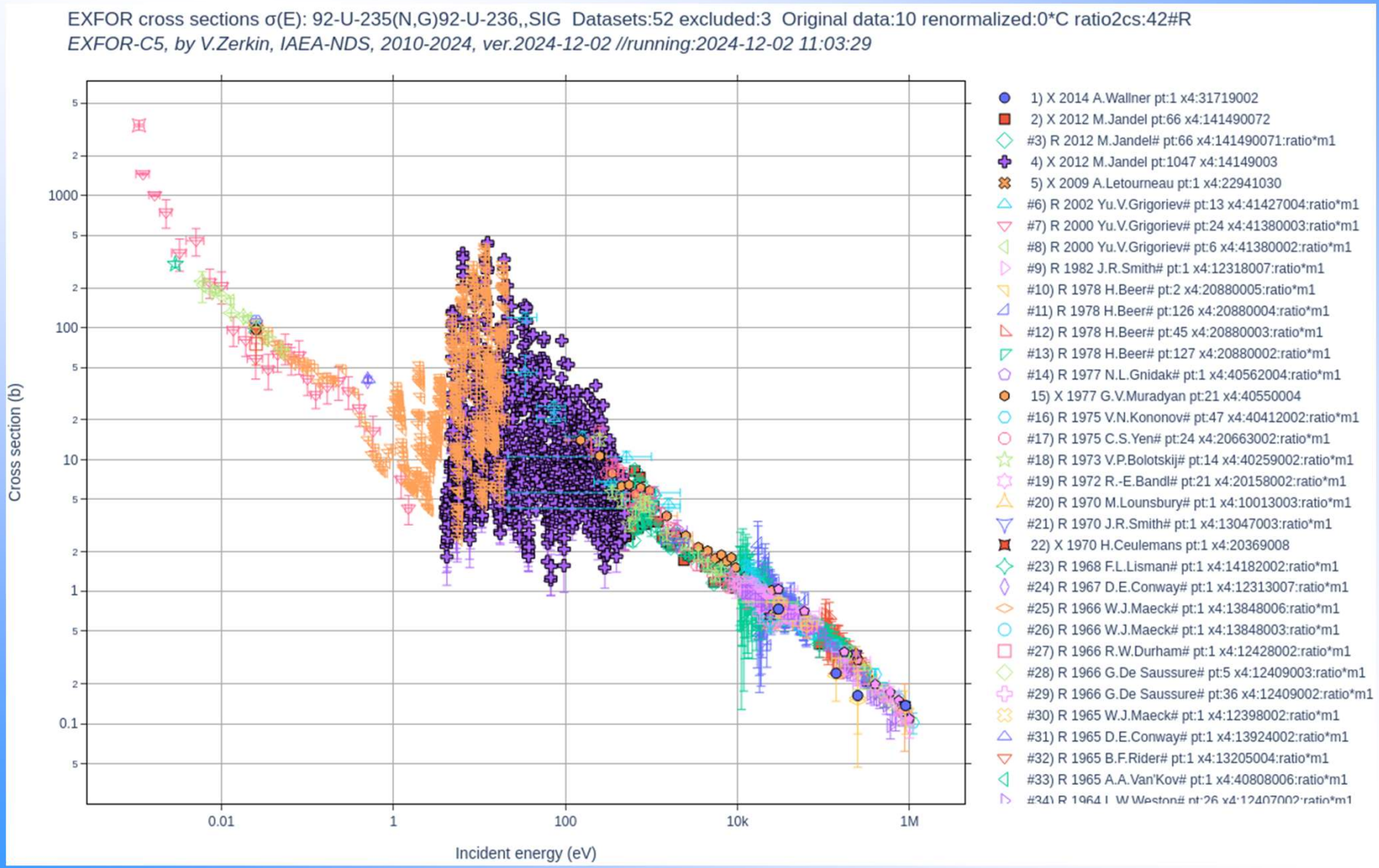
92-U-235(N,ABS),,ALF → 92-U-235(N,G)92-U-236,,SIG

SF3=ABS Absorption

SF6=ALF Alpha = capture/fission cross-section ratio

Original data: 10 datasets

Ratio2CS: 42 datasets



Concluding remarks

1. EXFOR-C5: seven versions of EXFOR translated to C5 with various parameters

2. Recent extension allows to calculate CS from ratios coded in EXFOR as reaction-ratios (R1)/(R2) and as (N,ABS),,ALF

3. Distribution includes indexing and plotting codes in Python and tool to produce single C5 file for backward compatibility with XC4

4. Data available for Downloading from NDS Web site and GitHub

Thank you.