

Nuclear Data Sensitivity Tool (NDaST) with CIELO XS

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WPEC Meetings
Date: May 2016

Overview

Compare ENDF/B-VII.1 vs predicted CIELO XS changes

- Load ENDF/B-VII.1 Van der Marck data into DICE

Union of Van der Marck data (~2000 benchmarks) and DICE sensitivity data (~4000 benchmarks) is ~**1500 benchmarks**. [limited to SDF with 238 EG]

- Processed** ENDF/B-VII.1 and CIELO XS with both NJOY99.393 (bad), NJOY2012.
- Load PENDF (prior to ACER) files into JANIS, take **ratio of CIELO/ENDFBVII.1 XS** in JANIS (collapse to 238 energy groups)
- Multiply XS ratio to XS sensitivity
- Impact of each isotope/reaction change

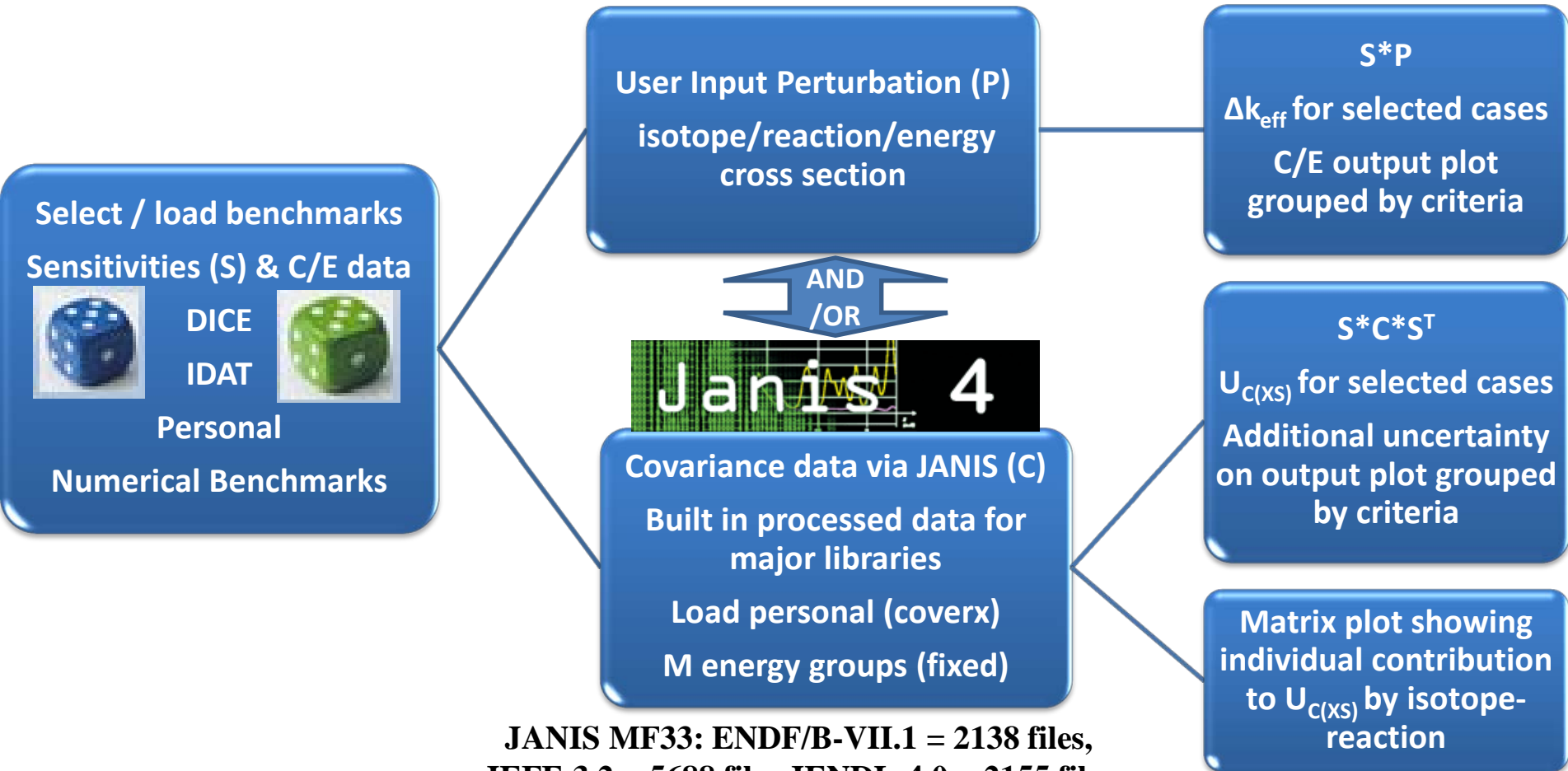
Only looking at MT2,MT4,MT18,MT102,MT452,CHI (slightly)

No MF4!

- Can also provide Excel tables

Nuclear Data Sensitivity Tool (NDaST) Flowchart

Benchmarks (Sensitivities) → Nuclear Data (% Change or Covariance) → Integral Results



**JANIS MF33: ENDF/B-VII.1 = 2138 files,
JEFF-3.2 = 5688 files JENDL-4.0 = 2155 files
TENDL-2013 = 77811 files**

Benchmark Set

Union of SVM and DICE

	THERM	INTER	FAST	MIXED
PU	362/608	5/10	86/121	9/9
HEU	530/895	20/32	121/403	27/84
IEU	22/180	6/21	15/43	0/23
LEU	472/1612	0/0	0/1	0/5
U233	56/197	0/29	10/10	0/8
MIX	134/436	0/7	40/67	0/26
SPEC	0/0	0/0	0/20	0/0

Pu239

[Pu-239](#)
[U-238](#)
[U-235](#)
[Fe-56](#)
[O-16](#)
[H-1](#)
[Validation](#)

Data files available for downloading:

#	Version	Description	Format	Link	Documents
1	C	A.C.(Skip) Kahler	ENDF	txt	[1]
2	239Pu_ENDF_LANL_23c	ENDF/B-VIII starter file (A.C.(Skip) Kahler)	ENDF	zip	
3			ACE	zip	
4	239Pu_ENDF_LANL_23c_nu8	ENDF/B-VIII starter file (A.C.(Skip) Kahler) with nu_bar (0.1eV--1MeV) from ENDF/B-VII.1	ENDF	zip	
5			ACE	zip	

Relevant documents

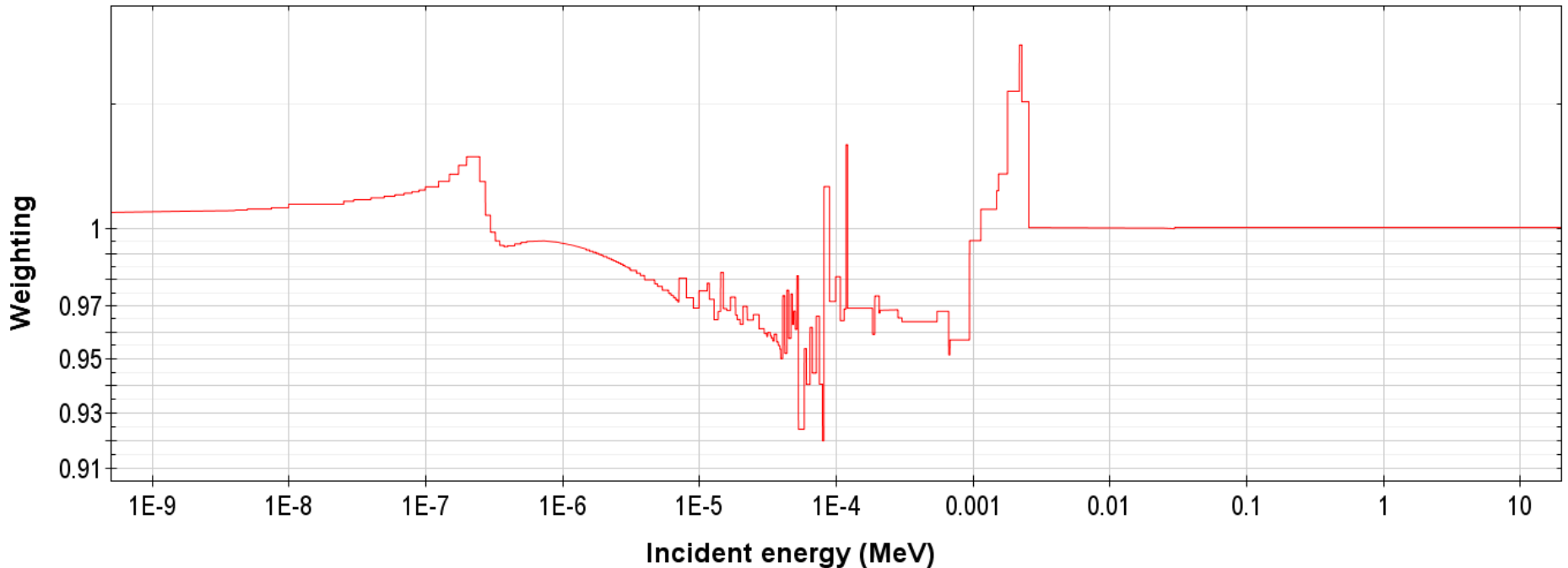
#	Date	Author	Title	Link
1	03/2015	A.K. Kahler	Content of MF1/MT451	(Unpublished)

pu239lanl23cnu8

	THERM	INTER	FAST	MIXED
PU	362/608	5/10	86/121	9/9

Pu239 MT2 CIELO/ENDFBVII.1

These graphs are always the ratio of CIELO to ENDF/B-VII.1 in 238 groups, taken by loading a PENDF into JANIS



Largest impact is on intermediate spectrum Pu239 benchmarks, but only ~-15 pcm!

Pu239 MT2 Summary

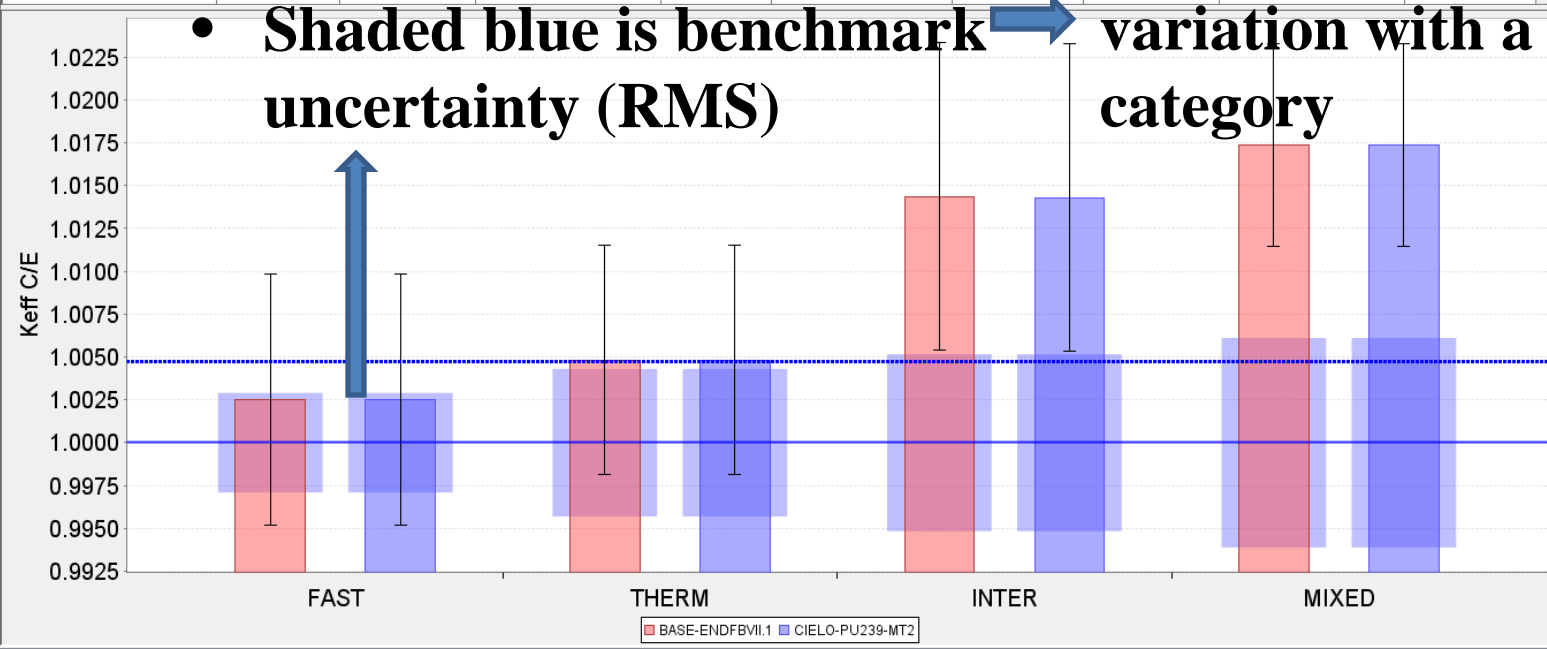
Red is always ENDF/B-VII.1

Blue is always CIELO

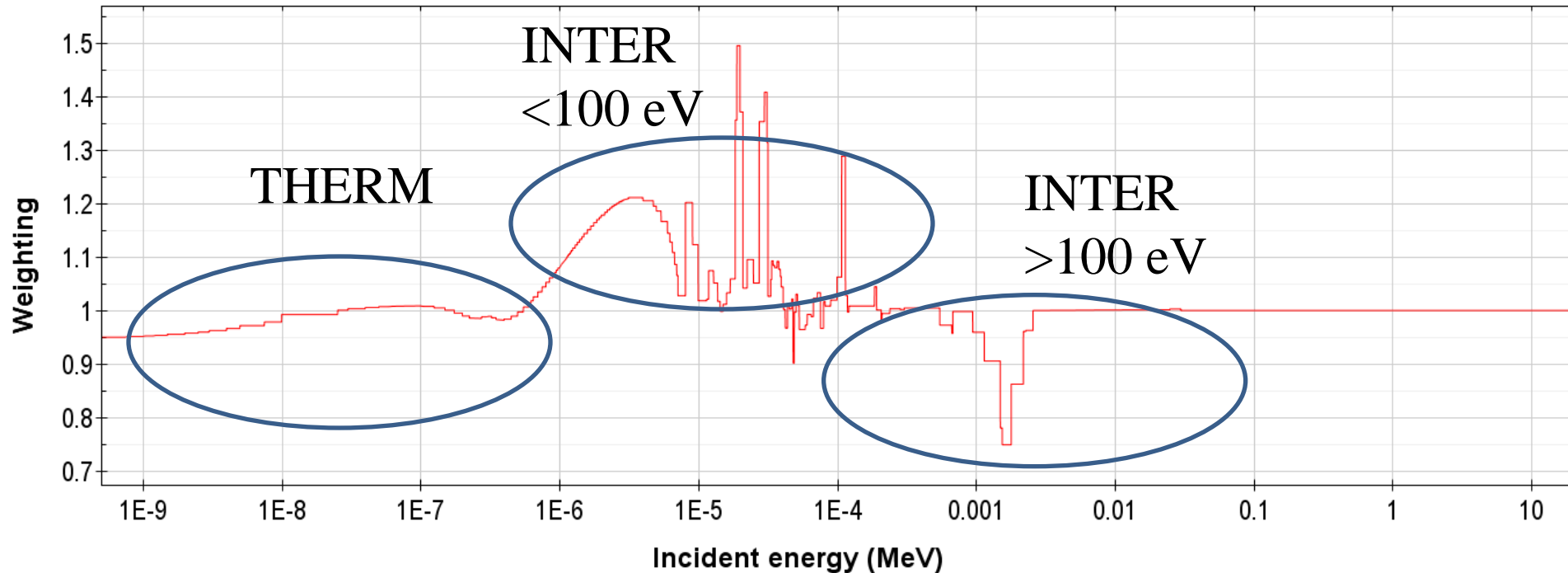
Case ID	E. Mean	E. Std dev	E. Uncertainty RMS	Code	Library	C. Mean	C. Std dev	C. Uncertainty RMS	C/E
PU-MET-FAST-001-001	1	0	0.00129	MCNP	BASE-ENDFBVII.1	0.99979	0	1e-5	0.99979
PU-MET-FAST-001-001	1	0	0.00129	MCNP	CIELO-PU239-MT2	0.99979	0	1e-5	0.99979
PU-MET-FAST-002-001	1	0	0.002	MCNP	BASE-ENDFBVII.1	0.99978	0	1e-5	0.99978
PU-MET-FAST-002-001	1	0	0.002	MCNP	CIELO-PU239-MT2	0.99978	0	1e-5	0.99978
PU-MET-FAST-003-001	1	0	0.003	MCNP	BASE-ENDFBVII.1	1.00201	0	1e-5	1.00201
PU-MET-FAST-003-001	1	0	0.003	MCNP	CIELO-PU239-MT2	1.00201	0	1e-5	1.00201
PU-MET-FAST-003-002	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.99583	0	1e-5	0.99583
PU-MET-FAST-003-002	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99584	0	1e-5	0.99584
PU-MET-FAST-003-003	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.99553	0	1e-5	0.99553
PU-MET-FAST-003-003	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99553	0	1e-5	0.99553
PU-MET-FAST-003-004	1	0	0.002	MCNP	BASE-ENDFBVII.1	0.99666	0	1e-5	0.99666
PU-MET-FAST-003-004	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99667	0	1e-5	0.99667
PU-MET-FAST-003-005	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.99792	0	1e-5	0.99792
PU-MET-FAST-003-005	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99792	0	1e-5	0.99792
PU-MET-FAST-004-001	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.99717	0	1e-5	0.99717
PU-MET-FAST-004-001	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99717	0	1e-5	0.99717
PU-MET-FAST-004-002	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.9976	0	1e-5	0.9976
PU-MET-FAST-004-002	1	0	0.003	MCNP	CIELO-PU239-MT2	0.9976	0	1e-5	0.9976
PU-MET-FAST-004-003	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.99746	0	1e-5	0.99746
PU-MET-FAST-004-003	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99746	0	1e-5	0.99746
PU-MET-FAST-004-004	1	0	0.003	MCNP	BASE-ENDFBVII.1	0.99721	0	1e-5	0.99721
PU-MET-FAST-004-004	1	0	0.003	MCNP	CIELO-PU239-MT2	0.99721	0	1e-5	0.99721

No Change

This Axis is always C/E



Pu239-MT18 CIELO/ENDFBVII.1

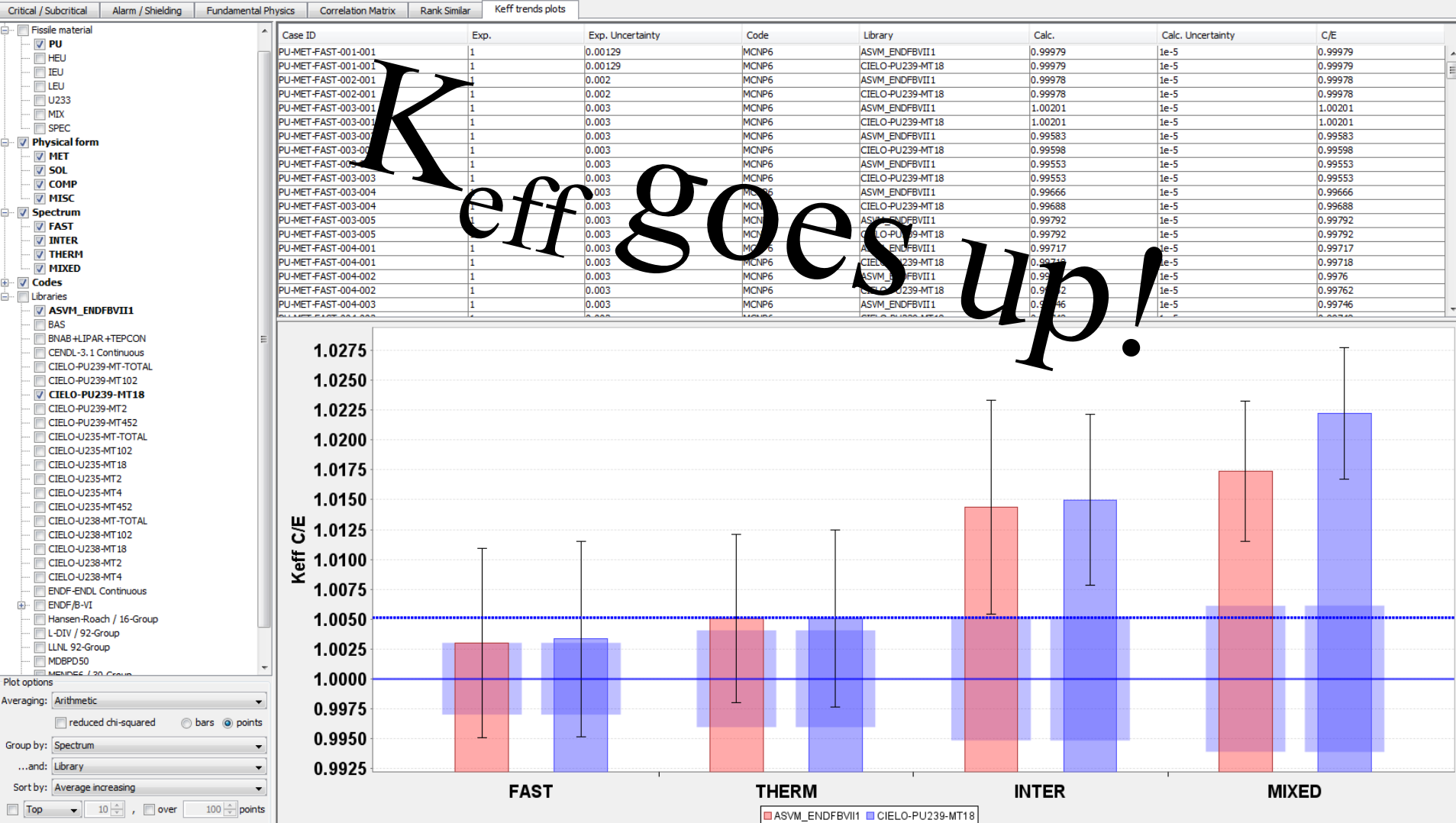


Noticeable change:

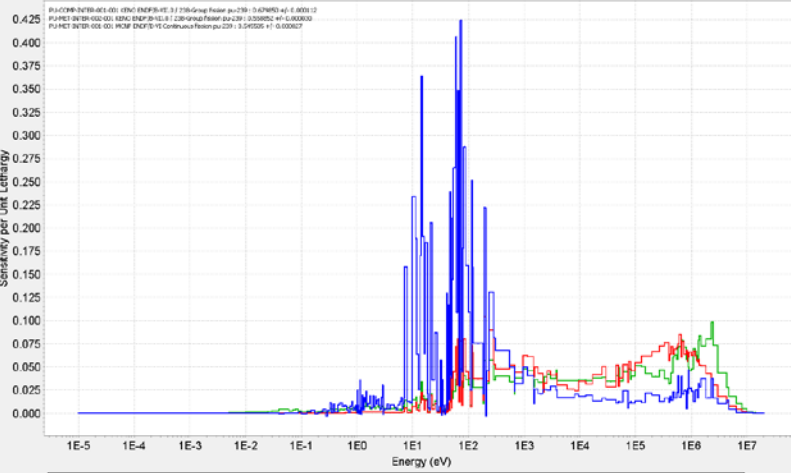
PU-INTER can move by +1700 pcm or -400 pcm

PU-THERM can move by +500 pcm

Pu239-MT18 CIELO/ENDFBVII.1



Pu239-MT18 Intermediate Spectrum



Uncertainty

37	37
32	32
26	26
1	1

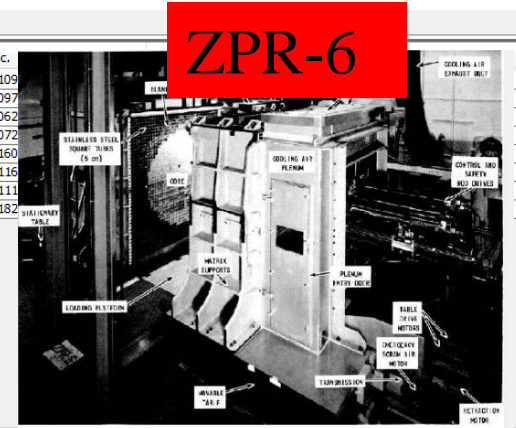
HECTOR

MCNP6	ASVM_ENDFBVII1
MCNP6	CIELO-PU239-MT18

name	unit	value	lower	upper
fuel	kg	10000.0	9500.0	10500.0
moderator	kg	10000.0	9500.0	10500.0
reflector	kg	10000.0	9500.0	10500.0
control	kg	10000.0	9500.0	10500.0
structure	kg	10000.0	9500.0	10500.0
total	kg	10000.0	9500.0	10500.0

Calc:

1.0109
1.0097
1.0062
1.0072
1.0160
1.0116
1.0111
1.0182



ZPR-6

Figure 1. View of the ZPR-6 Facility

- CIELO-PU239-MT102
- CIELO-PU239-MT18
- CIELO-PU239-MT2
- CIELO-PU239-MT452
- CIELO-U235-MT-TOTAL
- CIELO-U235-MT102
- CIELO-U235-MT18
- CIELO-U235-MT2
- CIELO-U235-MT4
- CIELO-U235-MT452
- CIELO-U238-MT-TOTAL
- CIELO-U238-MT102
- CIELO-U238-MT18
- CIELO-U238-MT2
- CIELO-U238-MT4
- ENDF-ENDL Continuous
- ENDF/B-VI
- Hansen-Roach / 16-Group
- L-DIV / 92-Group
- LLNL 92-Group
- MDBPD50
- MENDF / 30-Group

Plot options

Averaging:

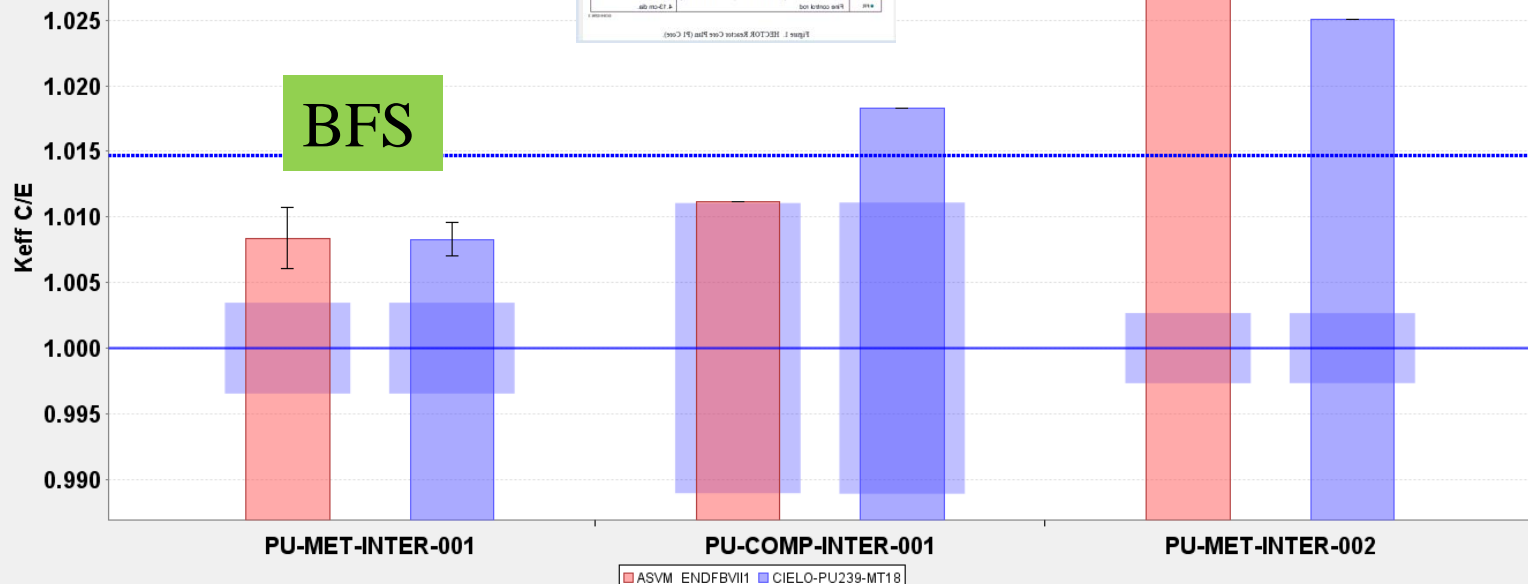
reduced chi-squared bars points

Group by:

...and:

Sort by:

Top 10 over 100 points



Pu239-MT18 THERM Benchmarks

Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
- Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB+LIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - Mendenhall

Plot options

Averaging: Arithmetic

reduced chi-squared bars points

Group by: Evaluation ID

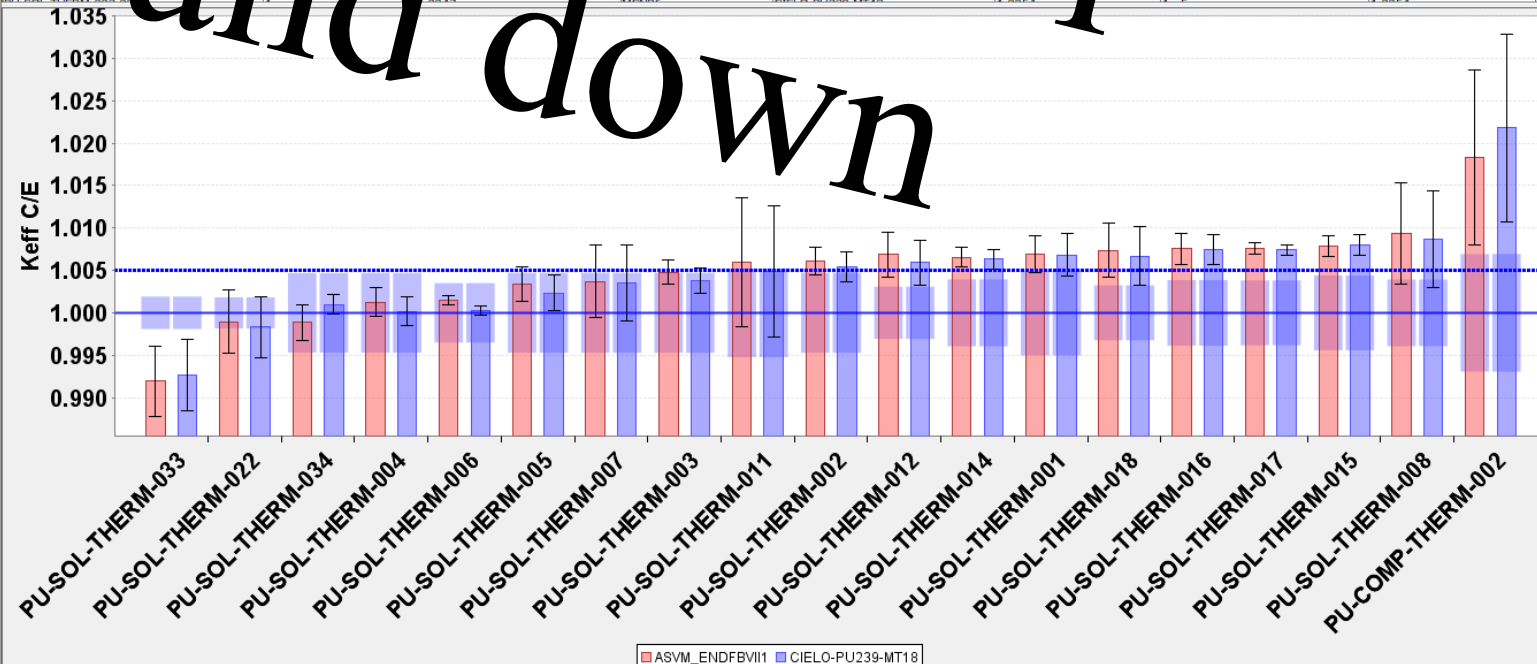
...and: Library

Sort by: Average increasing

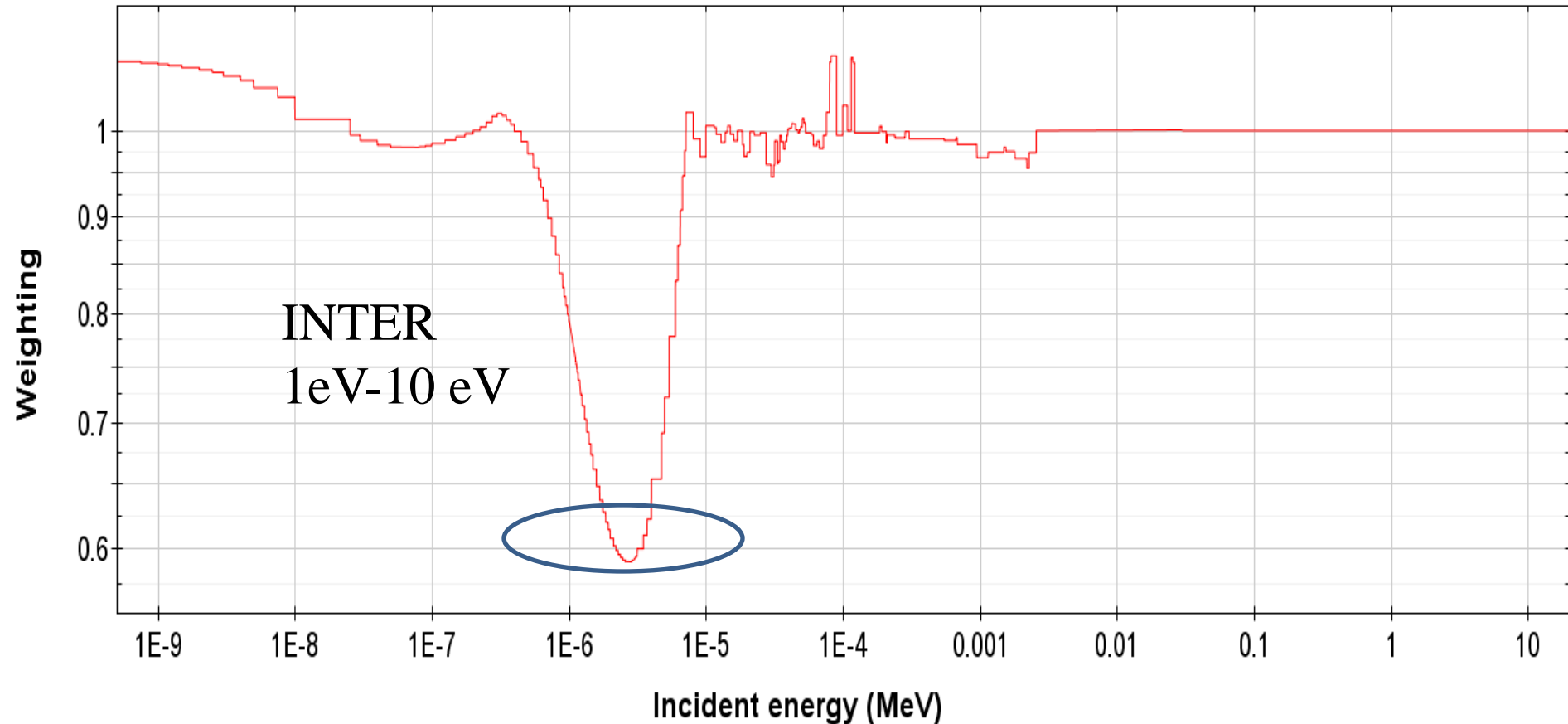
Top 10 over 100 points

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
PU-SOL-THERM-001-001	1	0.005	MCNP6	ASVM_ENDFBVII1	1.00394	1e-5	1.00394
PU-SOL-THERM-001-001	1	0.005	MCNP6	CIELO-PU239-MT18	1.0033	1e-5	1.0033
PU-SOL-THERM-001-002	1	0.005	MCNP6	ASVM_ENDFBVII1	1.00654	1e-5	1.00654
PU-SOL-THERM-001-002	1	0.005	MCNP6	CIELO-PU239-MT18	1.00613	1e-5	1.00613
PU-SOL-THERM-001-003	1	0.005	MCNP6	ASVM_ENDFBVII1	1.00986	1e-5	1.00986
PU-SOL-THERM-001-003	1	0.005	MCNP6	CIELO-PU239-MT18	1.00964	1e-5	1.00964
PU-SOL-THERM-001-004	1	0.005	MCNP6	ASVM_ENDFBVII1	1.00463	1e-5	1.00463
PU-SOL-THERM-001-004	1	0.005	MCNP6	CIELO-PU239-MT18	1.00453	1e-5	1.00453
PU-SOL-THERM-001-005	1	0.005	MCNP6	ASVM_ENDFBVII1	1.00755	1e-5	1.00755
PU-SOL-THERM-001-005	1	0.005	MCNP6	CIELO-PU239-MT18	1.00751	1e-5	1.00751
PU-SOL-THERM-001-006	1	0.005	MCNP6	ASVM_ENDFBVII1	1.00898	1e-5	1.00898
PU-SOL-THERM-001-006	1	0.005	MCNP6	CIELO-PU239-MT18	1.00993	1e-5	1.00993
PU-SOL-THERM-002-001	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00435	1e-5	1.00435
PU-SOL-THERM-002-001	1	0.0047	MCNP6	CIELO-PU239-MT18	1.0035	1e-5	1.0035
PU-SOL-THERM-002-002	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00548	1e-5	1.00548
PU-SOL-THERM-002-002	1	0.0047	MCNP6	CIELO-PU239-MT18	1.00464	1e-5	1.00464
PU-SOL-THERM-002-003	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00394	1e-5	1.00394
PU-SOL-THERM-002-003	1	0.0047	MCNP6	CIELO-PU239-MT18	1.00317	1e-5	1.00317
PU-SOL-THERM-002-004	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00613	1e-5	1.00613
PU-SOL-THERM-002-004	1	0.0047	MCNP6	CIELO-PU239-MT18	1.00654	1e-5	1.00654

K_{eff} goes up and down

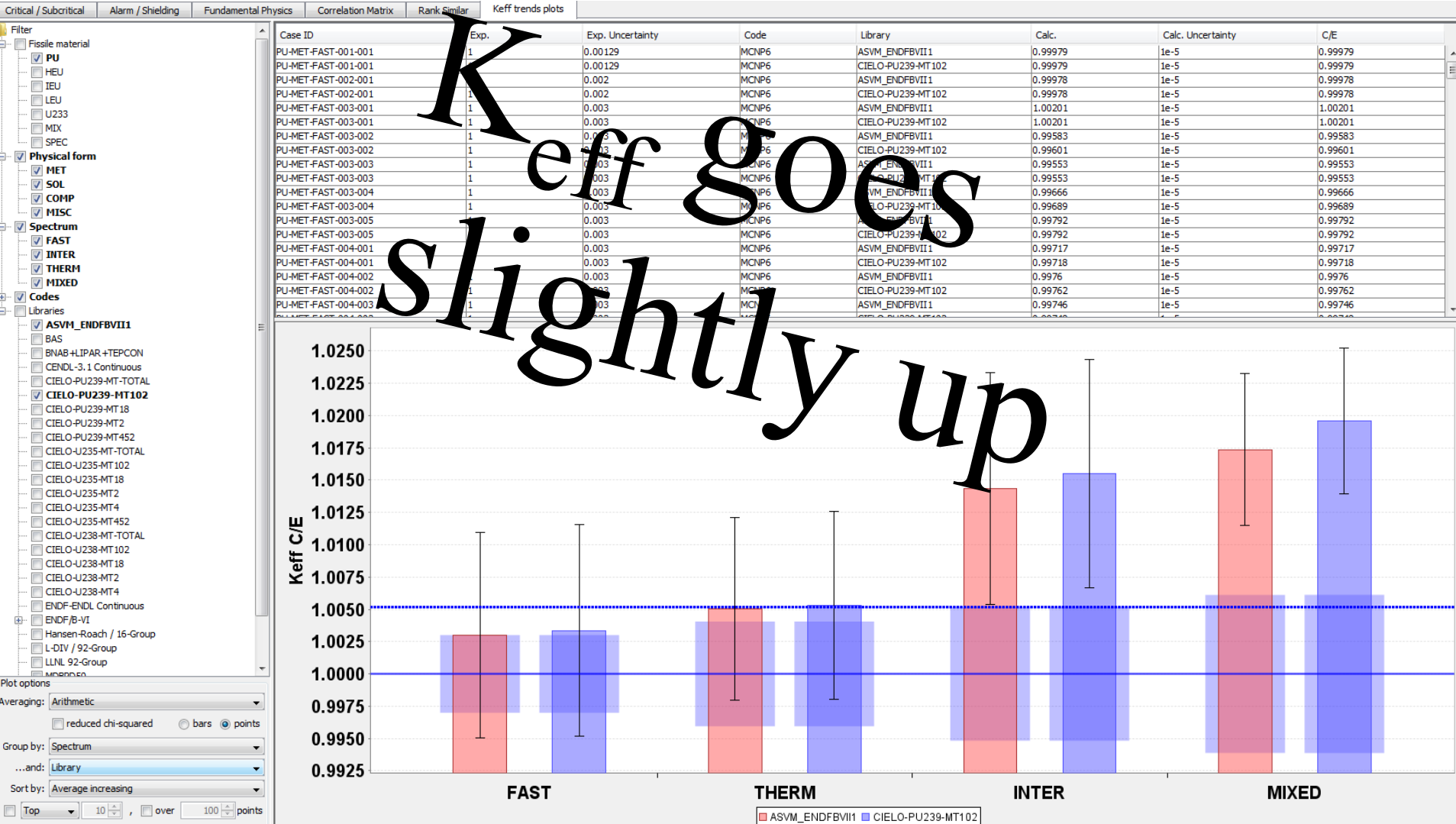


Pu239-MT102 CIELO/ENDFBVII.1



**Noticeable change:
PU-THERM can move by +500 pcm**

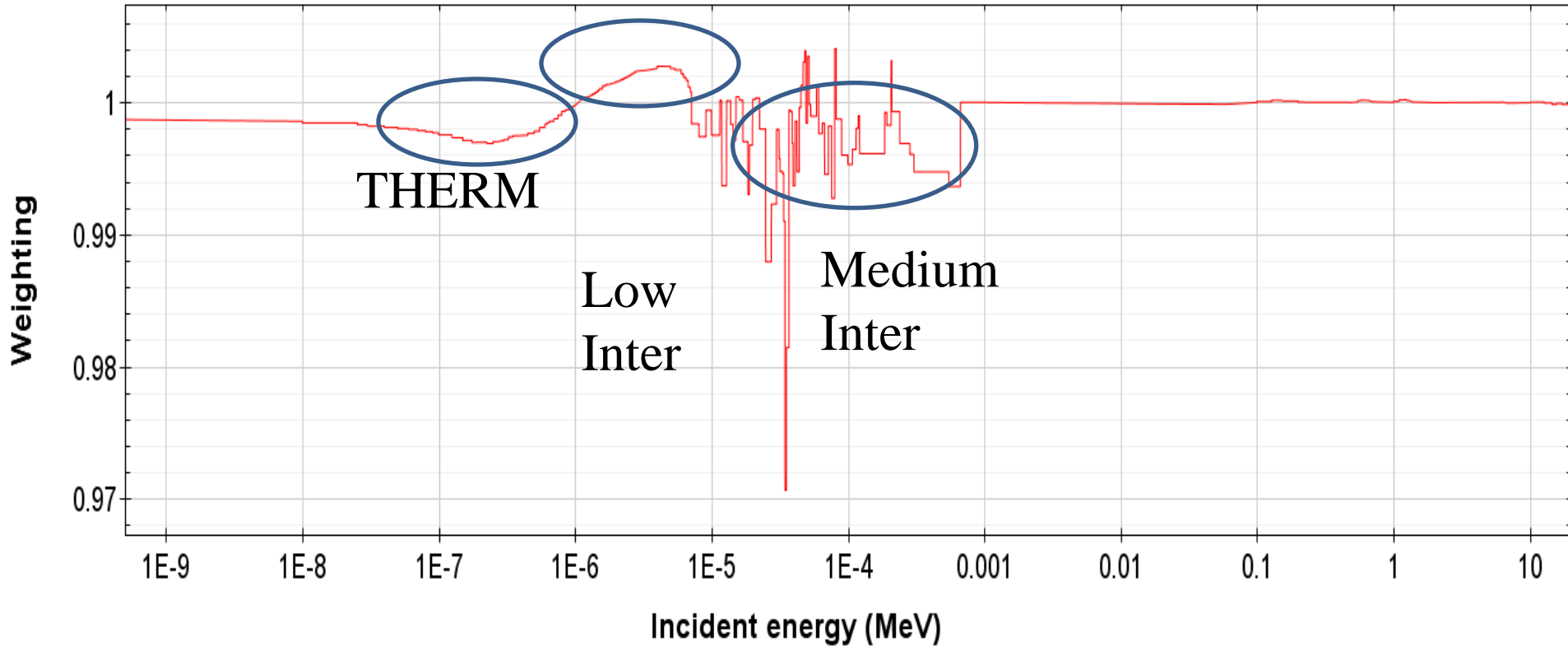
Pu239-MT102 CIELO/ENDFBVII.1



Pu239 MT102 THERM Benchmarks

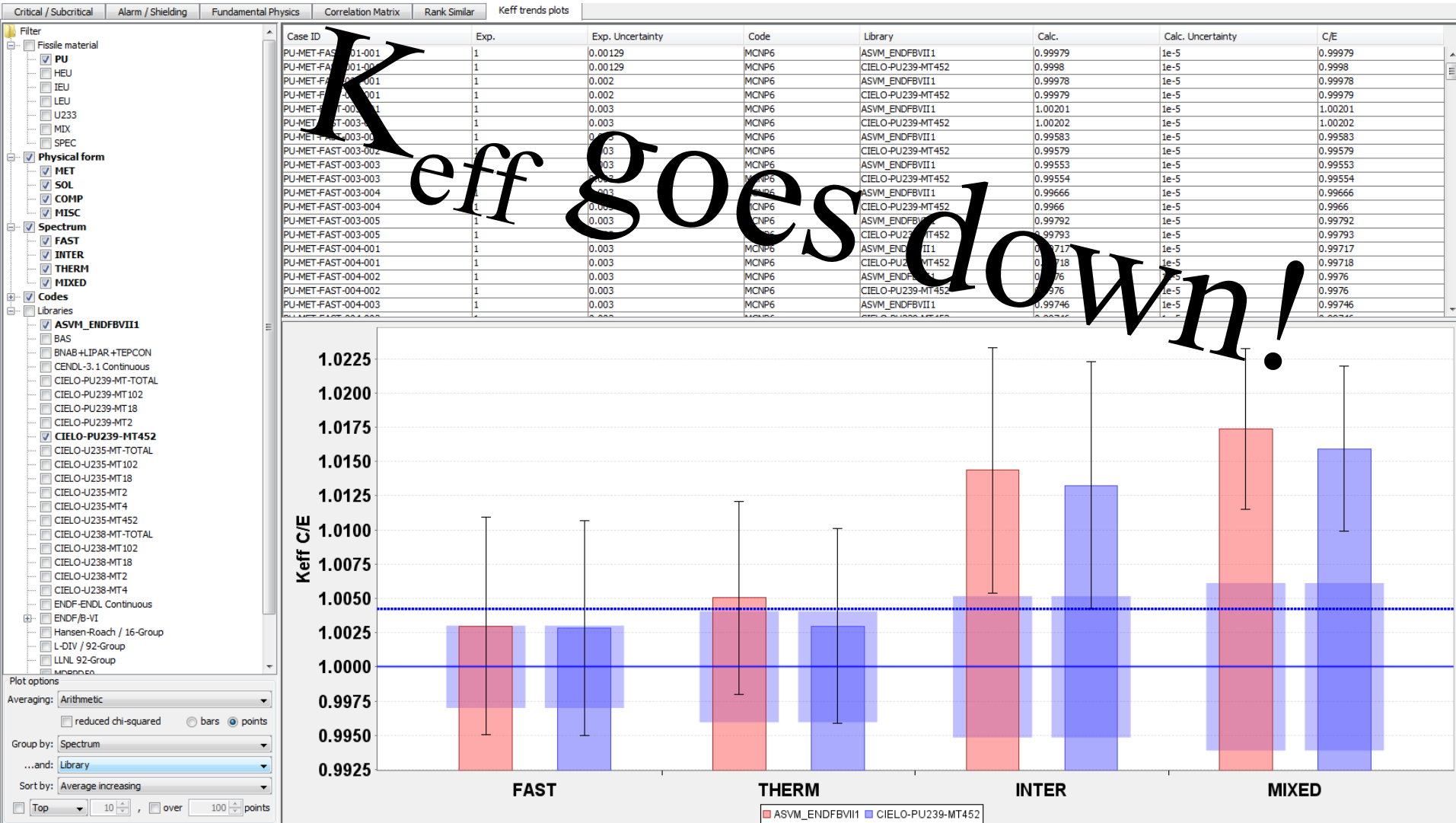


Pu239-MT452 CIELO/ENDFBVII.1

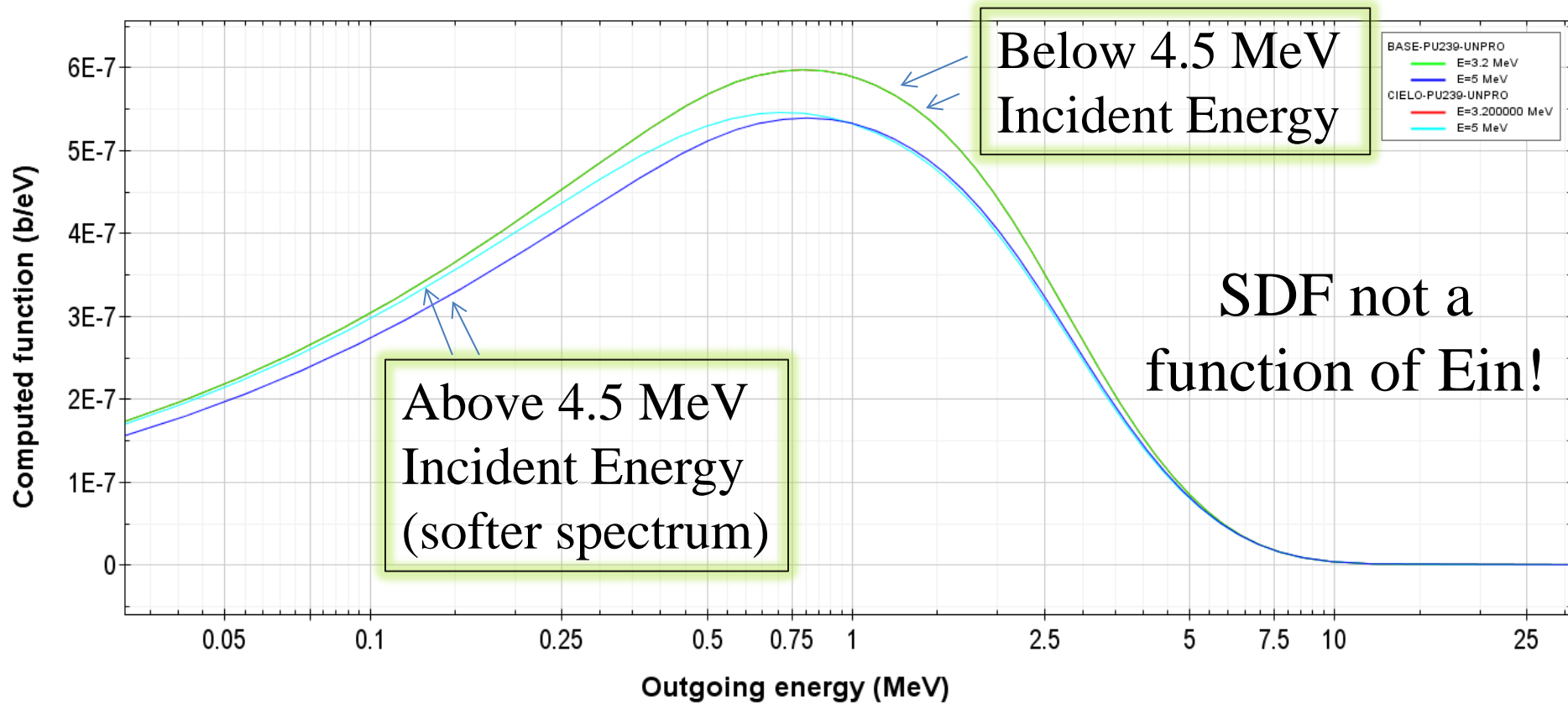


**Noticeable change:
PU-THERM can move by -200 pcm**

Pu239-MT452 Summary



Pu239-PNFS CIELO/ENDFBVII.1

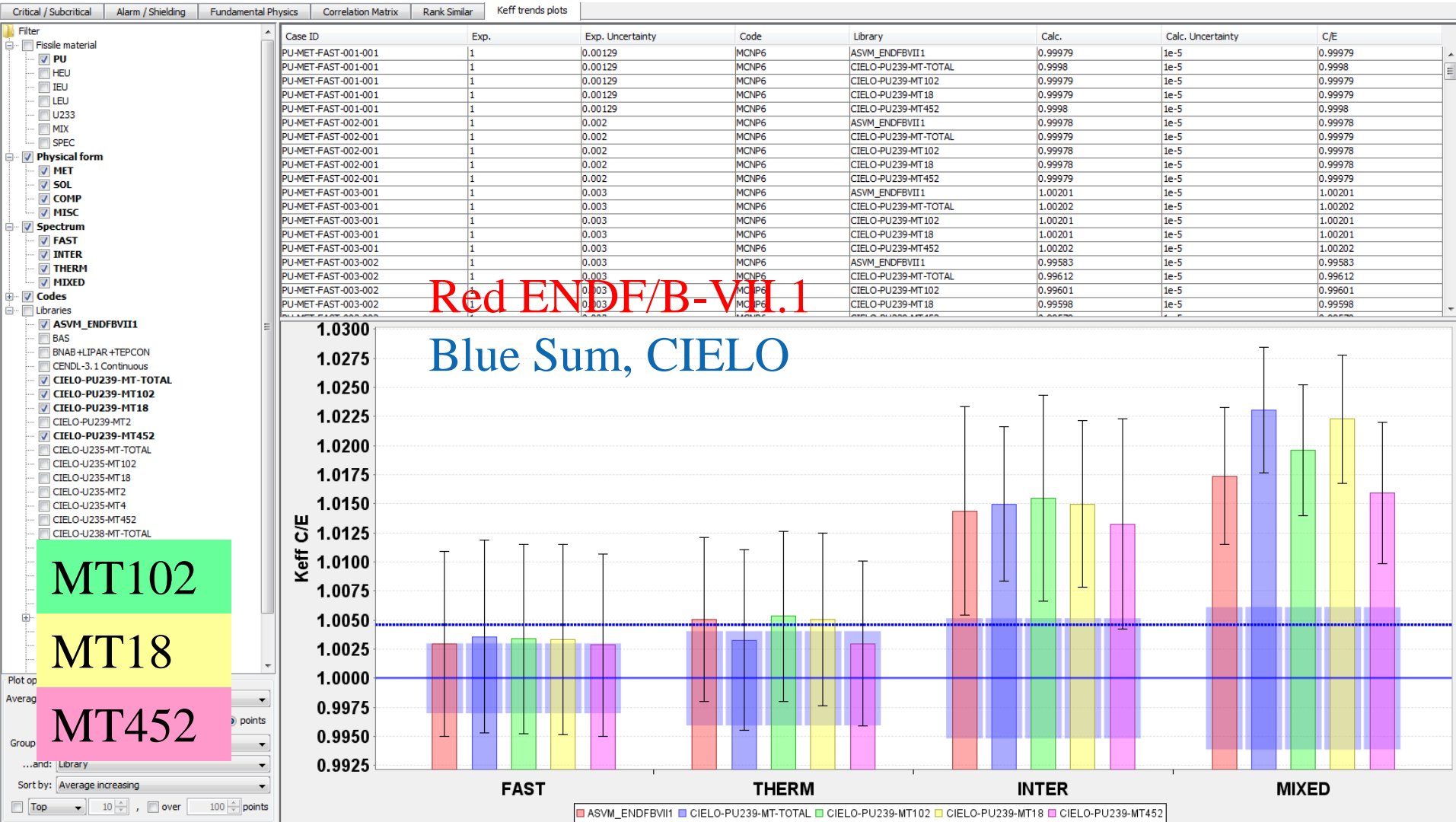


Impact of CHI @ Incident Energy 5.5 MeV

For PMF001 using CHI @ $E_{in}=5.5$ MeV, difference is +50 pcm.

Only 5% of fissions are above 5.5 MeV, so ~5 pcm impact.

Pu239, Sum of MF18, MT102, MF452



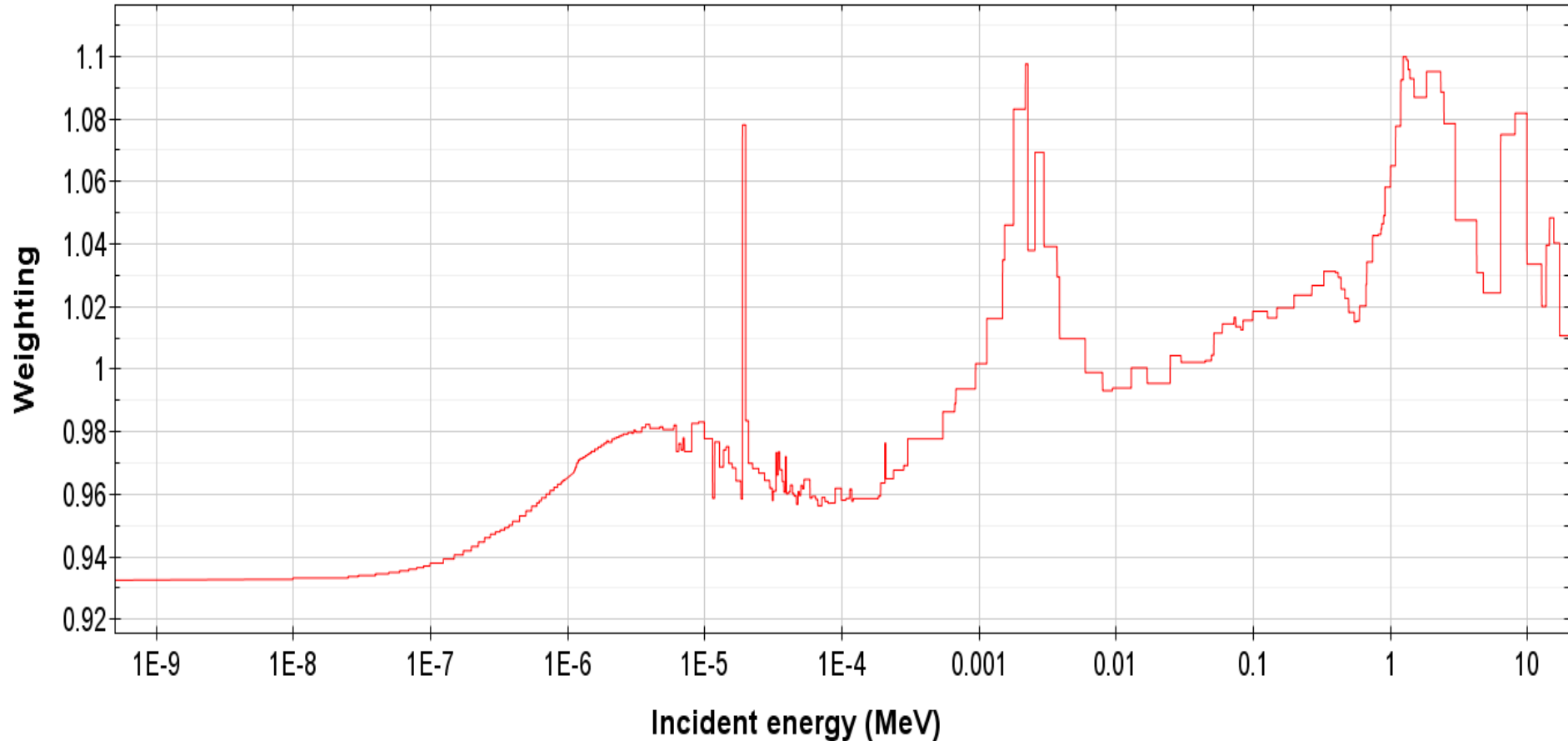
U235

#	Version	Description	Format	Link	Documents
1	u235g6	GANDR fit of PFNS at thermal and fast(1.e-5 eV, 500-2000 eV) (IAEA)	ENDF	zip	[1,2]
2			ACE	zip	
3		Pointwise thermal spectrum in Dosimetry format	ENDF	txt	
4		Thermal spectrum in 640-group Dosimetry format	ENDF	txt	
5		Thermal spectrum in text format (E, spectrum, unc.)	text	txt	
6	u235o4brc2	Resonance evaluation ORNL4 combined with BRC2 evaluation for fast neutrons (Rev.1, moved last zero point im MT5 to 2.25 keV, 10 April 2015)	ENDF	zip	[4]
7		Rev.1 (fixed Doppler broadening between 2 and 2.25 keV)	ACE	zip	[4,5]
8	u235g6nj4	u235g6 with inelastic data from JENDL-4 evaluation, 16 April 2015)	ENDF	zip	
9			ACE	zip	
10	u235ib02o4cWg6anu	u235 evaluation - see document [7], August 2015)	ENDF	zip	
11			ACE	zip	
12	u235g6a	GMA PFNS at thermal, GANDR fast(1.e-5 eV, 500-2000 eV) (IAEA)	ENDF	zip	
13			ACE	zip	
14	u235g6b	GMA PFNS at thermal, ENDF/B-VII.1 above (IAEA)	ENDF	zip	
15			ACE	zip	
16	u235g6c	GMA PFNS at thermal, Talou (PFNS CRP) above (IAEA)	ENDF	zip	
17			ACE	zip	
18	u235ib02i2g6cnu3f2	IRSN.v2 resonance, IAEA beta2 fast, GMA PFNS thermal, Talou above (IAEA PFNS CRP), tweaked nu-bar	ENDF	withdrawn	[8]
19	u235ib02i2ag6cnu3f2	Same as u235ib02i2g6cnu3f2 with resonance parameters corrected for the loss of digits	ENDF	zip	[8]
20			ACE	zip	
21	235U_ENDF_LANL_19c	ENDF/B-VIII starter file (A.C.(Skip) Kahler)	ENDF	zip	[8]
22			ACE	zip	
23	u235ib06ao17g6cnu5cf2	New Empire calculation "ib6a", improved RR parameters "o17c" (corrected for missing data above 20 MeV on 20-Apr-2016)	ENDF	zip	
24			ACE	zip	(include heating, 20-Apr-2016)

u235ib06ao17g6cnu5cf2.endf

	THERM	INTER	FAST	MIXED
HEU	530/895	20/32	121/403	27/84
IEU	22/180	6/21	15/43	0/23
LEU	472/1612	0/0	0/1	0/5
MIX	134/436	0/7	40/67	0/26

U235 MT2 CIELO/ENDFBVII.1



Fast benchmarks increase

Changes to thermal benchmarks are small

U235 MT2 CIELO/ENDFBVII.1

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
PU-SOL-THERM-007-003	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.01002	1e-5	1.01002
PU-SOL-THERM-007-003	1	0.0047	MCNP6	CIELO-U235-MT2	1.01002	1e-5	1.01002
PU-SOL-THERM-007-004	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00338	1e-5	1.00338
PU-SOL-THERM-007-004	1	0.0047	MCNP6	CIELO-U235-MT2	1.00338	1e-5	1.00338
PU-SOL-THERM-007-005	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00561	1e-5	1.00561
PU-SOL-THERM-007-005	1	0.0047	MCNP6	CIELO-U235-MT2	1.00561	1e-5	1.00561
PU-SOL-THERM-007-006	1	0.0047	MCNP6	ASVM_ENDFBVII1	0.99851	1e-5	0.99851
PU-SOL-THERM-007-006	1	0.0047	MCNP6	CIELO-U235-MT2	0.99851	1e-5	0.99851
PU-SOL-THERM-007-007	1	0.0047	MCNP6	ASVM_ENDFBVII1	0.99809	1e-5	0.99809
PU-SOL-THERM-007-007	1	0.0047	MCNP6	CIELO-U235-MT2	0.99809	1e-5	0.99809
PU-SOL-THERM-007-008	1	0.0047	MCNP6	ASVM_ENDFBVII1	1.00053	1e-5	1.00053
PU-SOL-THERM-007-008	1	0.0047	MCNP6	CIELO-U235-MT2	1.00053	1e-5	1.00053
PU-SOL-THERM-008-016	1	0.0033	MCNP6	ASVM_ENDFBVII1	1.00853	1e-5	1.00853
PU-SOL-THERM-008-016	1	0.0033	MCNP6	CIELO-U235-MT2	1.00853	1e-5	1.00853
PU-SOL-THERM-008-017	1	0.004	MCNP6	ASVM_ENDFBVII1	1.01173	1e-5	1.01173
PU-SOL-THERM-008-017	1	0.004	MCNP6	CIELO-U235-MT2	1.01173	1e-5	1.01173
PU-SOL-THERM-008-018	1	0.004	MCNP6	ASVM_ENDFBVII1	1.01567	1e-5	1.01567
PU-SOL-THERM-008-018	1	0.004	MCNP6	CIELO-U235-MT2	1.01567	1e-5	1.01567
PU-SOL-THERM-008-019	1	0.0028	MCNP6	ASVM_ENDFBVII1	1.00922	1e-5	1.00922
PU-SOL-THERM-008-019	1	0.0028	MCNP6	CIELO-U235-MT2	1.00922	1e-5	1.00922

- TICU
- IEU
- LEU
- U233
- MIX
- SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
- Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB-HIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - MDBPDS0
 - MENDF6 / 30-Group
 - RED2002 Continuous
 - UKNDL

Plot options

Averaging: Arithmetic

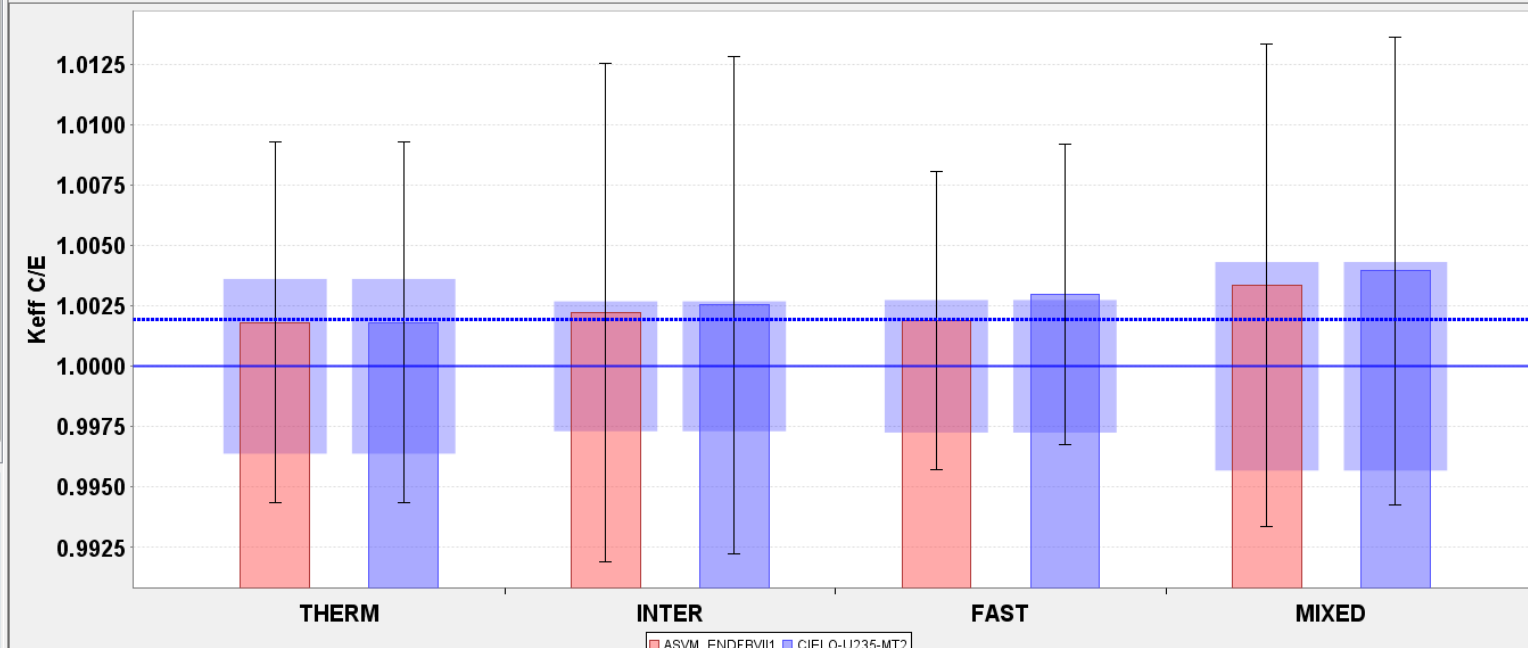
reduced chi-squared bars points

Group by: Spectrum

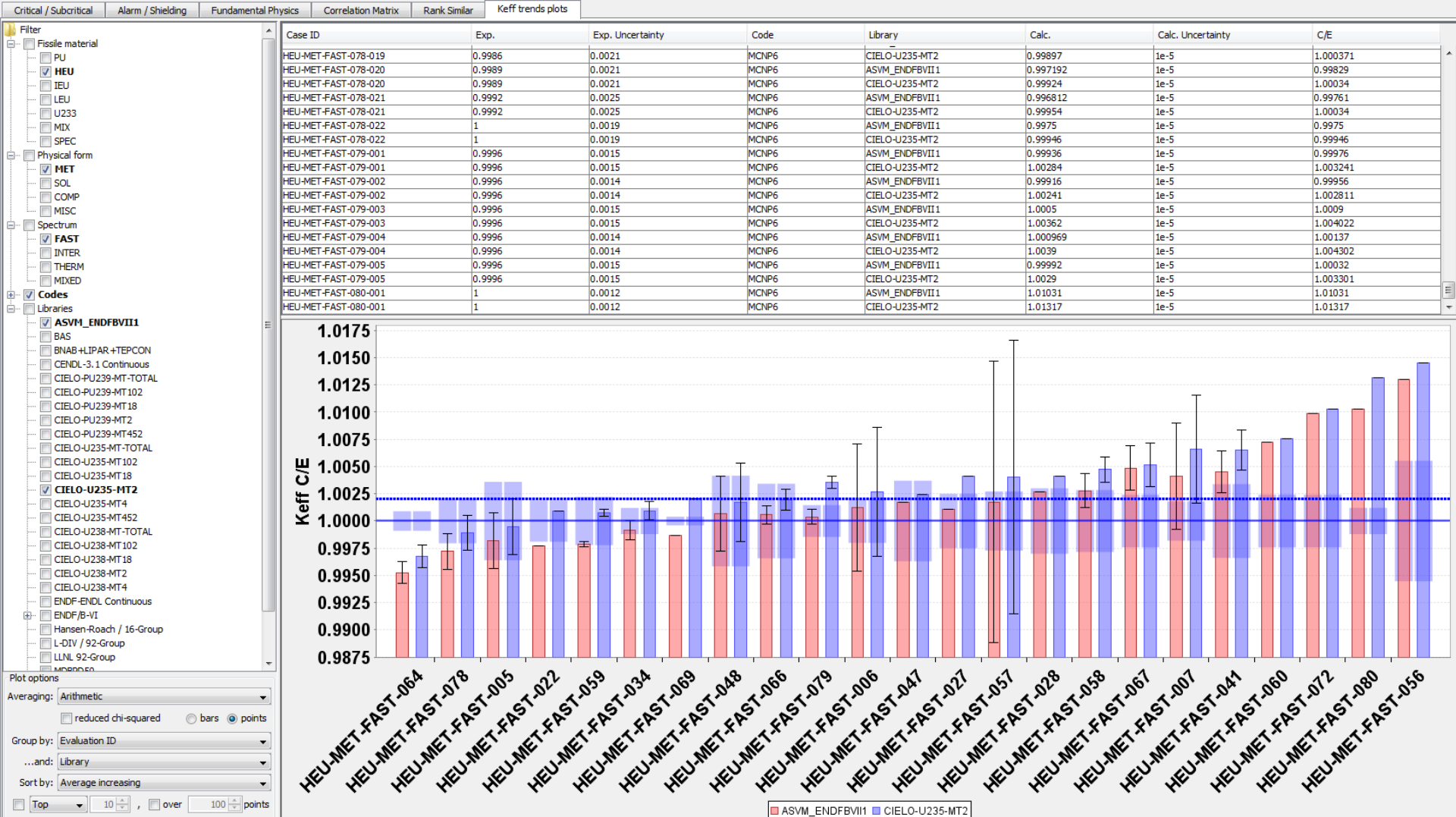
...and: Library

Sort by: Average increasing

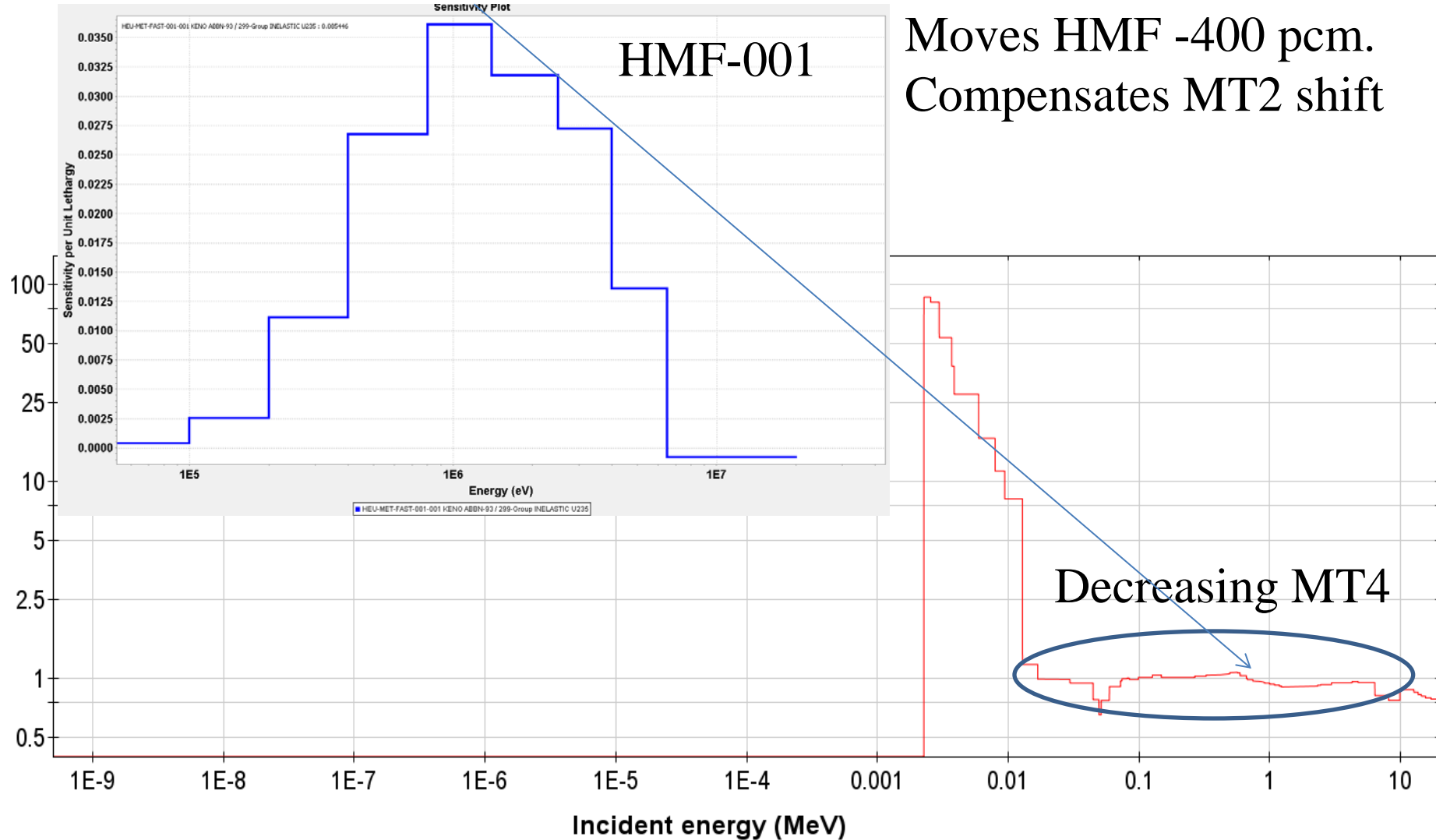
Top 10 over 100 points



U235 MT2 CIELO/ENDFBVII.1 HMF Benchmarks



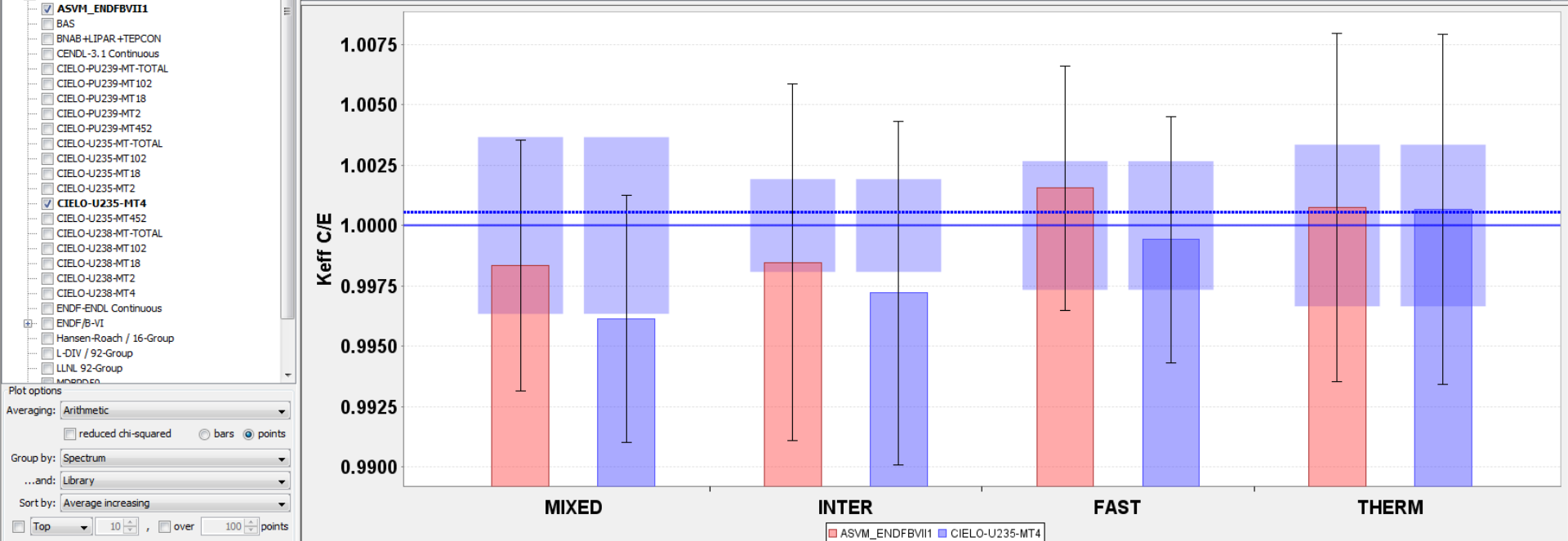
U235 MT4 CIELO/ENDFBVII.1



U235 MT4 CIELO/ENDFBVII.1

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
HEU-MET-FAST-048-007	0.9998	0.005	MCNP6	ASVM_ENDFBVII1	1.00163	1e-5	1.00183
HEU-MET-FAST-048-007	0.9998	0.005	MCNP6	CIELO-U235-MT4	0.99919	1e-5	0.99939
HEU-MET-FAST-048-008	0.9981	0.004	MCNP6	ASVM_ENDFBVII1	0.998709	1e-5	1.00061
HEU-MET-FAST-048-008	0.9981	0.0047	MCNP6	CIELO-U235-MT4	0.99686	1e-5	0.998758
HEU-MET-FAST-048-009	0.9983	0.0024	MCNP6	ASVM_ENDFBVII1	0.99855	1e-5	1.00025
HEU-MET-FAST-048-009	0.9983	0.0024	MCNP6	CIELO-U235-MT4	0.99678	1e-5	0.998477
HEU-MET-FAST-048-011	0.9997	0.0039	MCNP6	ASVM_ENDFBVII1	1.004529	1e-5	1.00483
HEU-MET-FAST-048-011	0.9997	0.0039	MCNP6	CIELO-U235-MT4	1.00253	1e-5	1.002831
HEU-MET-FAST-048-012	1.0005	0.0046	MCNP6	ASVM_ENDFBVII1	1.00122	1e-5	1.00072
HEU-MET-FAST-048-012	1.0005	0.0046	MCNP6	CIELO-U235-MT4	0.99965	1e-5	0.99915
HEU-MET-FAST-048-013	0.9989	0.0036	MCNP6	ASVM_ENDFBVII1	1.004784	1e-5	1.00589
HEU-MET-FAST-048-013	0.9989	0.0036	MCNP6	CIELO-U235-MT4	1.00385	1e-5	1.004955
HEU-MET-FAST-048-014	1.0011	0.0049	MCNP6	ASVM_ENDFBVII1	0.99949	1e-5	0.99885
HEU-MET-FAST-048-014	1.0011	0.0049	MCNP6	CIELO-U235-MT4	0.9982	1e-5	0.997103
HEU-MET-FAST-048-015	0.9981	0.0062	MCNP6	ASVM_ENDFBVII1	0.998669	1e-5	1.00057
HEU-MET-FAST-048-015	0.9981	0.0062	MCNP6	CIELO-U235-MT4	0.99663	1e-5	0.998527
HEU-MET-FAST-048-016	0.9988	0.004	MCNP6	ASVM_ENDFBVII1	0.99401	1e-5	0.99521
HEU-MET-FAST-048-016	0.9988	0.004	MCNP6	CIELO-U235-MT4	0.9922	1e-5	0.993953
HEU-MET-FAST-048-017	0.9978	0.0054	MCNP6	ASVM_ENDFBVII1	0.990686	1e-5	0.99287

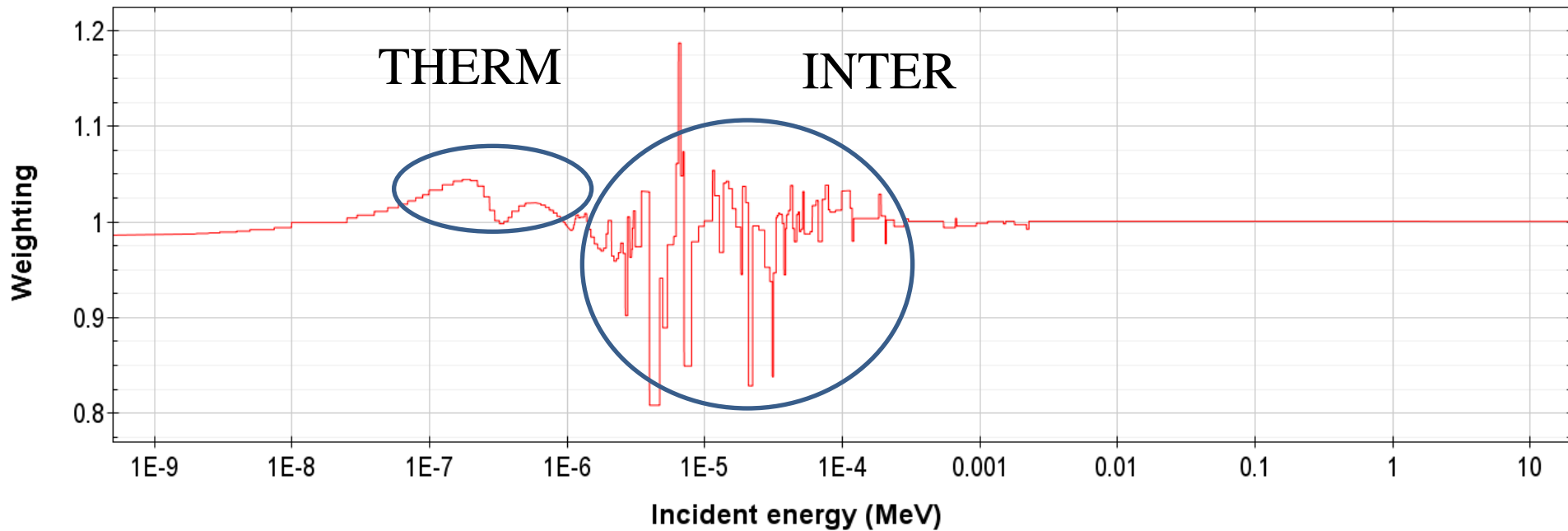
K_{eff} down



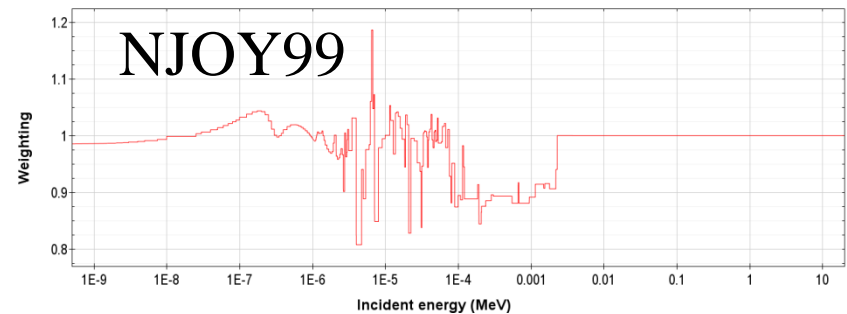
U235 MT4 CIELO/ENDFBVII.1 HM-F/M



U235 MT18 CIELO/ENDFBVII.1



THERM +500 pcm (Max)



U235 MT18 CIELO/ENDFBVII.1



U235 MT18 CIELO/ENDFBVII.1 HEU/IEU-MET-INTER/MIXED

Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
- Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB+LIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - WARRINGTON

Plot options

Averaging: Arithmetic

reduced chi-squared bars points

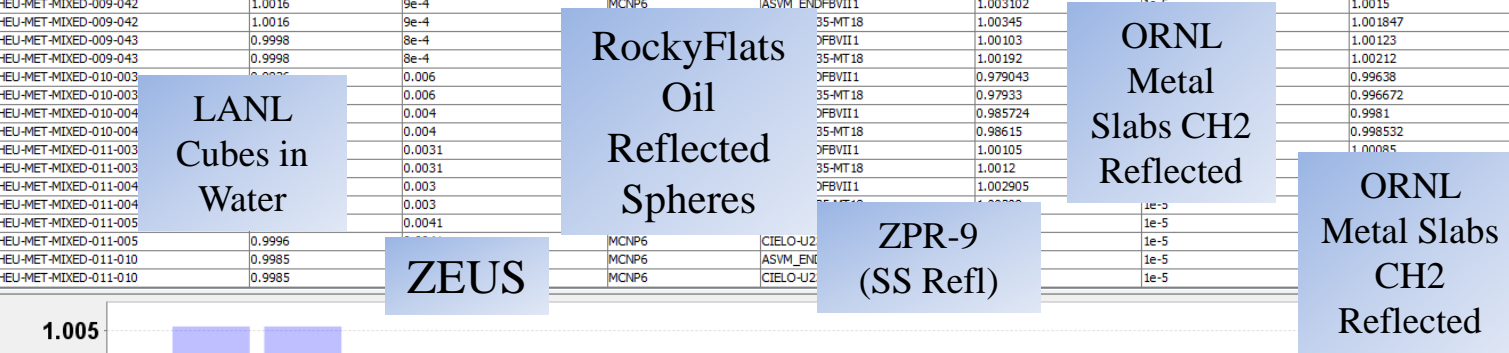
Group by: Evaluation ID

...and: Library

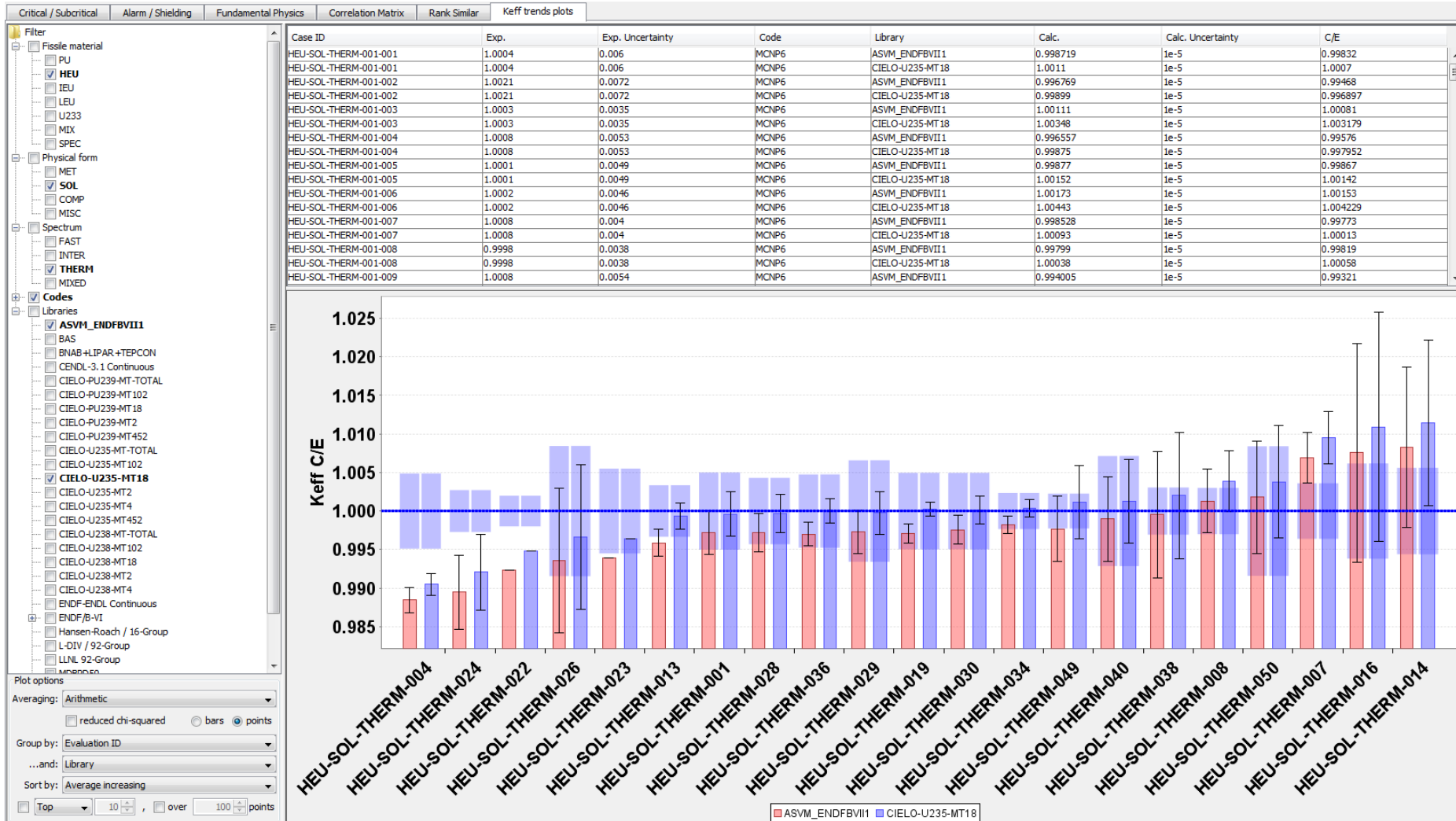
Sort by: Average increasing

Top 10 over 100 points

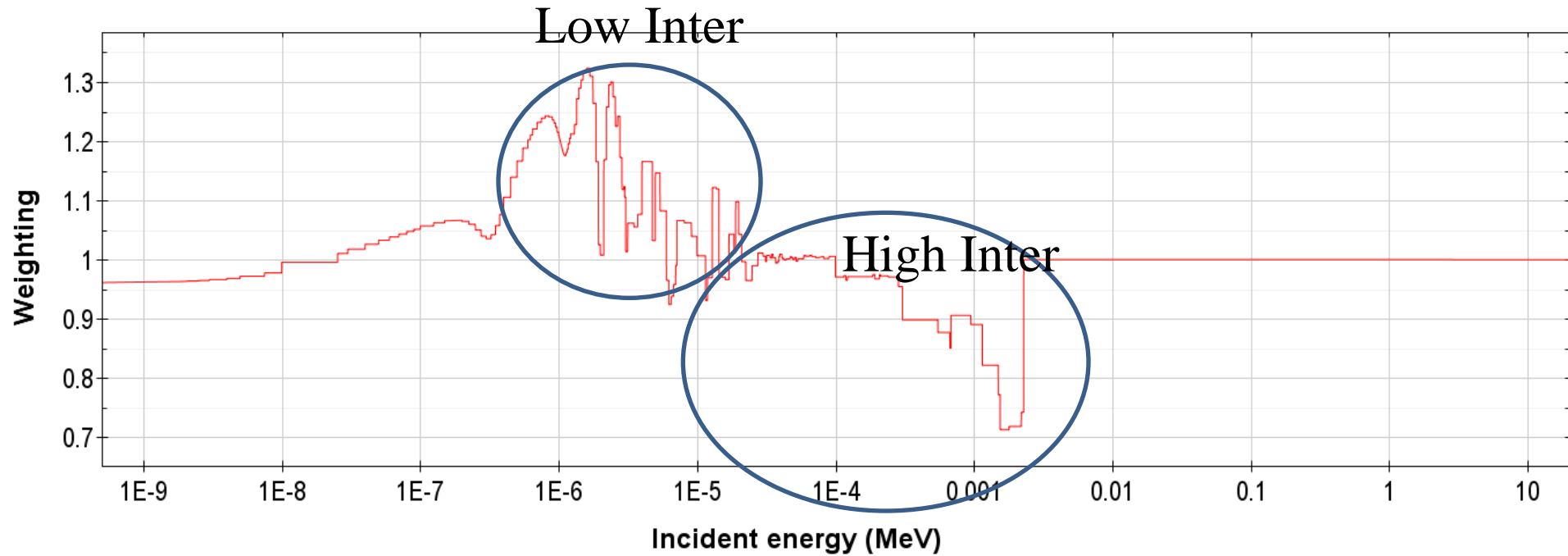
Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
HEU-MET-MIXED-009-040	1.0013	8e-4	MCNP6	CIELO-U235-MT18	1.00591	1e-5	1.004604
HEU-MET-MIXED-009-041	0.9994	9e-4	MCNP6	ASVM_ENDFBVII1	1.001419	1e-5	1.00202
HEU-MET-MIXED-009-041	0.9994	9e-4	MCNP6	CIELO-U235-MT18	1.00181	1e-5	1.002411
HEU-MET-MIXED-009-042	1.0016	9e-4	MCNP6	ASVM_ENDFBVII1	1.003102	1e-5	1.0015
HEU-MET-MIXED-009-042	1.0016	9e-4	MCNP6	CIELO-U235-MT18	1.00345	1e-5	1.001847
HEU-MET-MIXED-009-043	0.9998	8e-4	MCNP6	ASVM_ENDFBVII1	1.00103	1e-5	1.00123
HEU-MET-MIXED-009-043	0.9998	8e-4	MCNP6	CIELO-U235-MT18	1.00192	1e-5	1.00212
HEU-MET-MIXED-010-003	0.9998	0.006	MCNP6	ASVM_ENDFBVII1	0.979043	1e-5	0.99638
HEU-MET-MIXED-010-003	0.9998	0.006	MCNP6	CIELO-U235-MT18	0.97933	1e-5	0.996672
HEU-MET-MIXED-010-004	0.9998	0.004	MCNP6	ASVM_ENDFBVII1	0.985724	1e-5	0.9981
HEU-MET-MIXED-010-004	0.9998	0.004	MCNP6	CIELO-U235-MT18	0.98615	1e-5	0.998532
HEU-MET-MIXED-011-003	0.9998	0.0031	MCNP6	ASVM_ENDFBVII1	1.00105	1e-5	1.00085
HEU-MET-MIXED-011-003	0.9998	0.0031	MCNP6	CIELO-U235-MT18	1.0012	1e-5	1.00123
HEU-MET-MIXED-011-004	0.9998	0.003	MCNP6	ASVM_ENDFBVII1	1.002905	1e-5	1.002905
HEU-MET-MIXED-011-004	0.9998	0.003	MCNP6	CIELO-U235-MT18	1.002905	1e-5	1.002905
HEU-MET-MIXED-011-005	0.9996	0.0041	MCNP6	CIELO-U235-MT18	1.002905	1e-5	1.002905
HEU-MET-MIXED-011-010	0.9985	0.003	MCNP6	ASVM_ENDFBVII1	1.002905	1e-5	1.002905
HEU-MET-MIXED-011-010	0.9985	0.003	MCNP6	CIELO-U235-MT18	1.002905	1e-5	1.002905



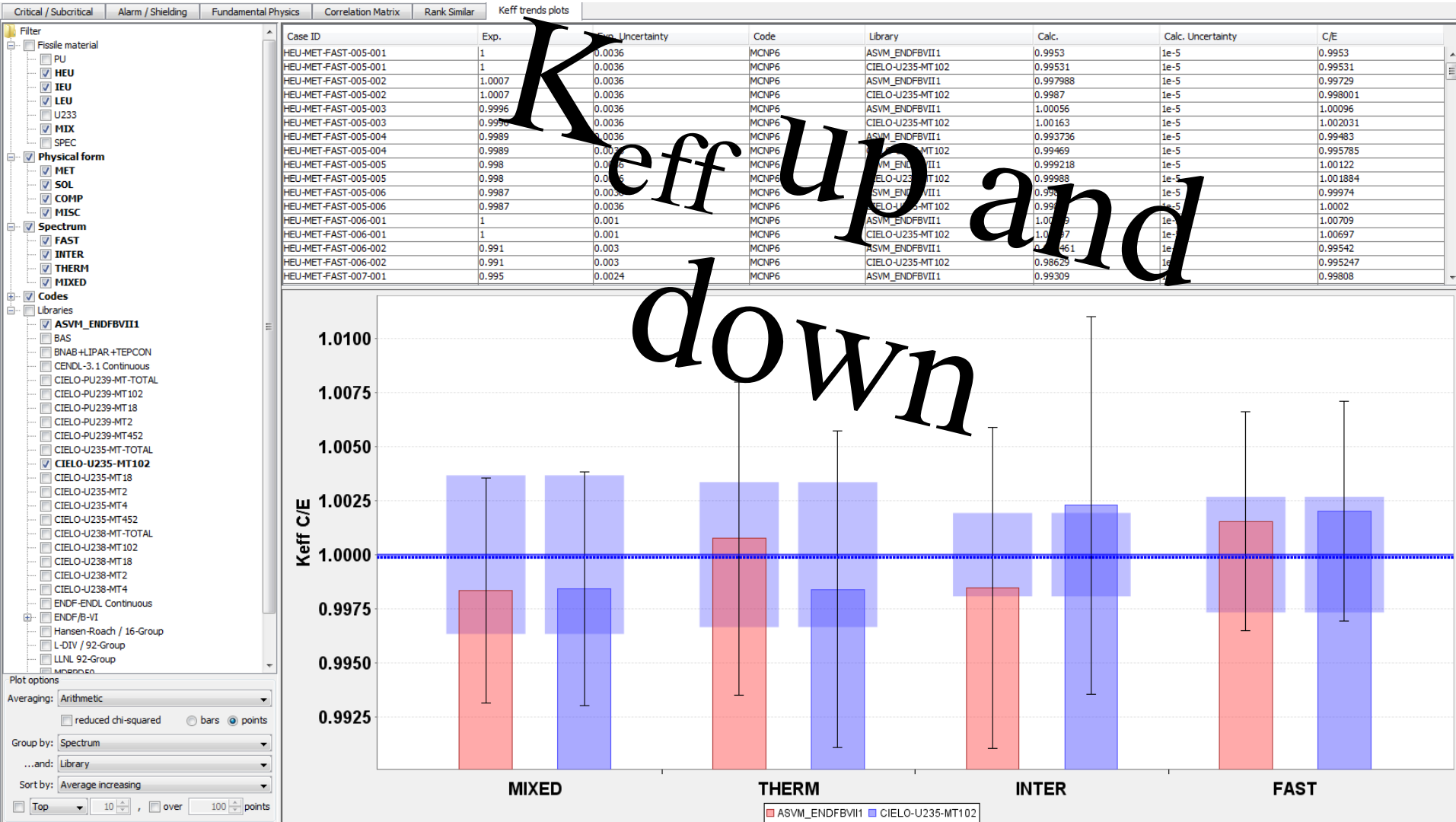
U235 MT18 CIELO/ENDFBVII.1 HEU-SOL-THERM



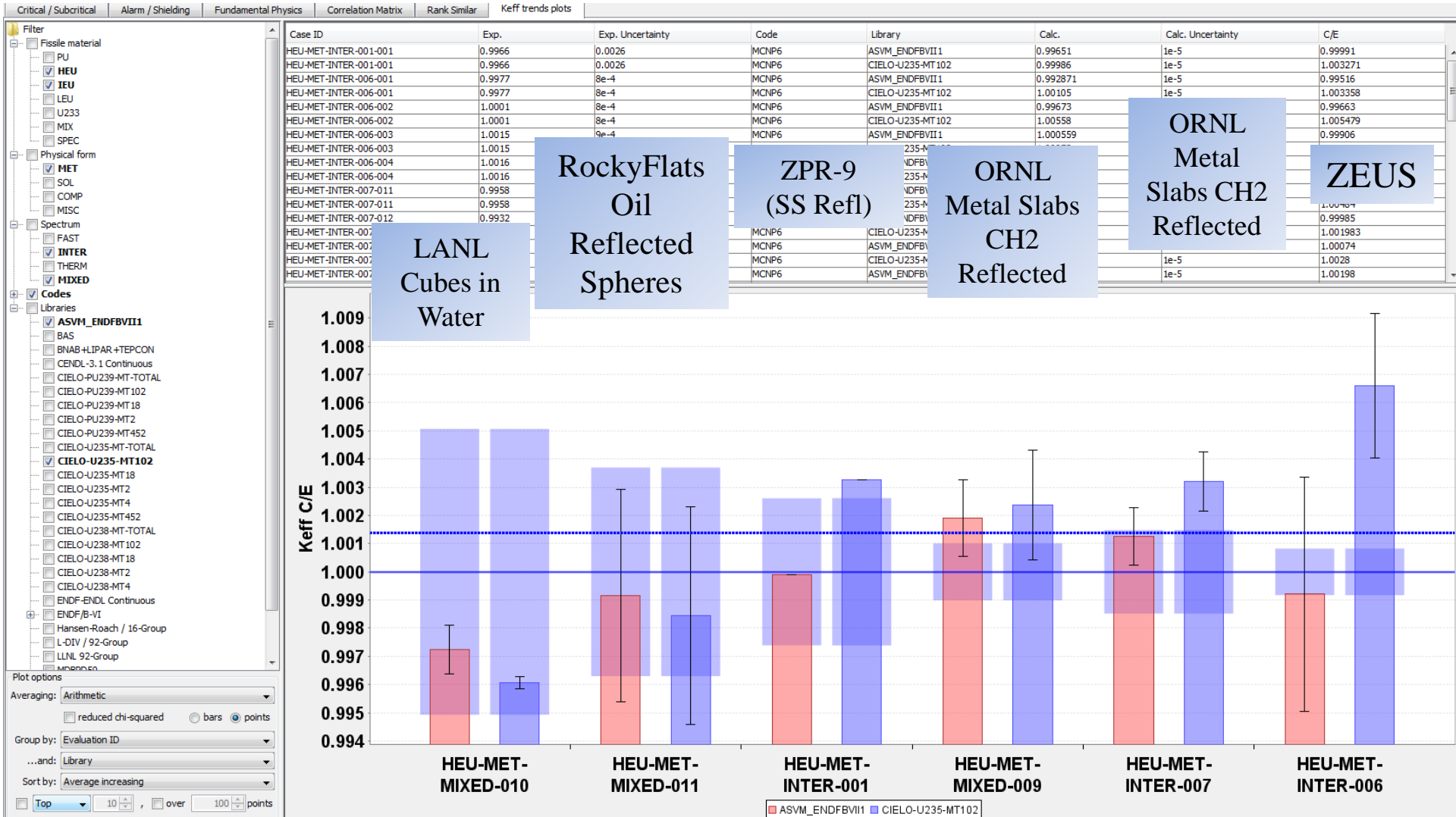
U235 MT102 CIELO/ENDFBVII.1



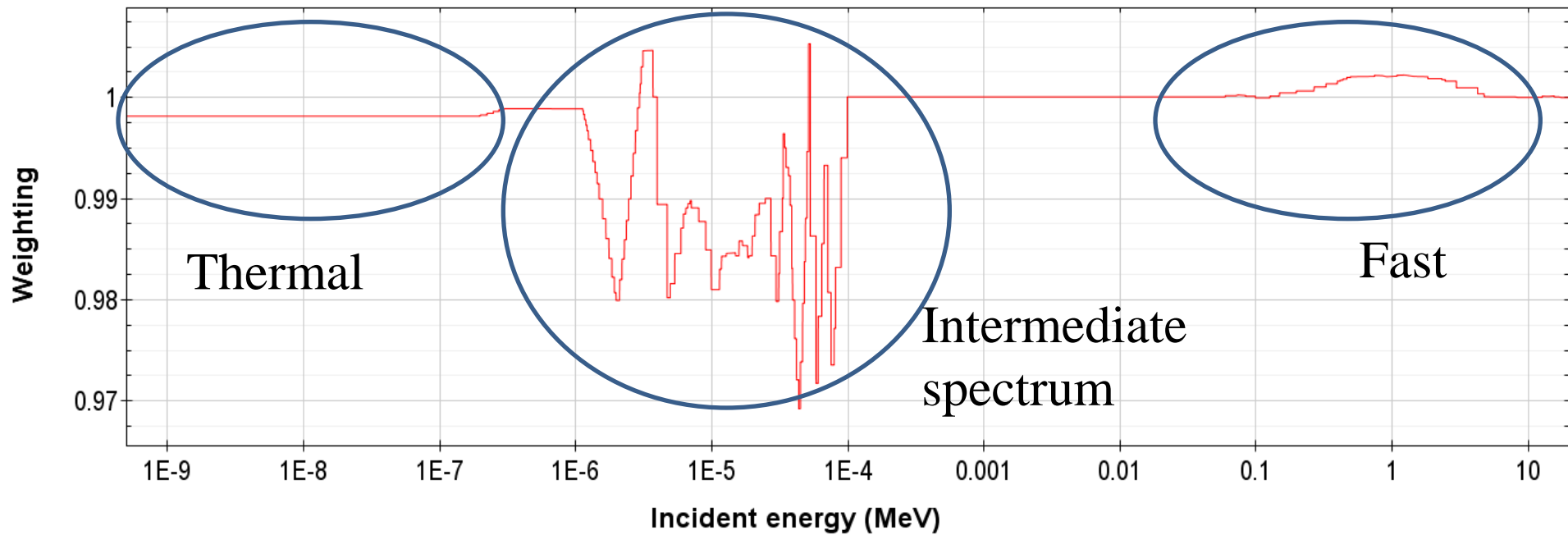
U235 MT102 CIELO/ENDFBVII.1



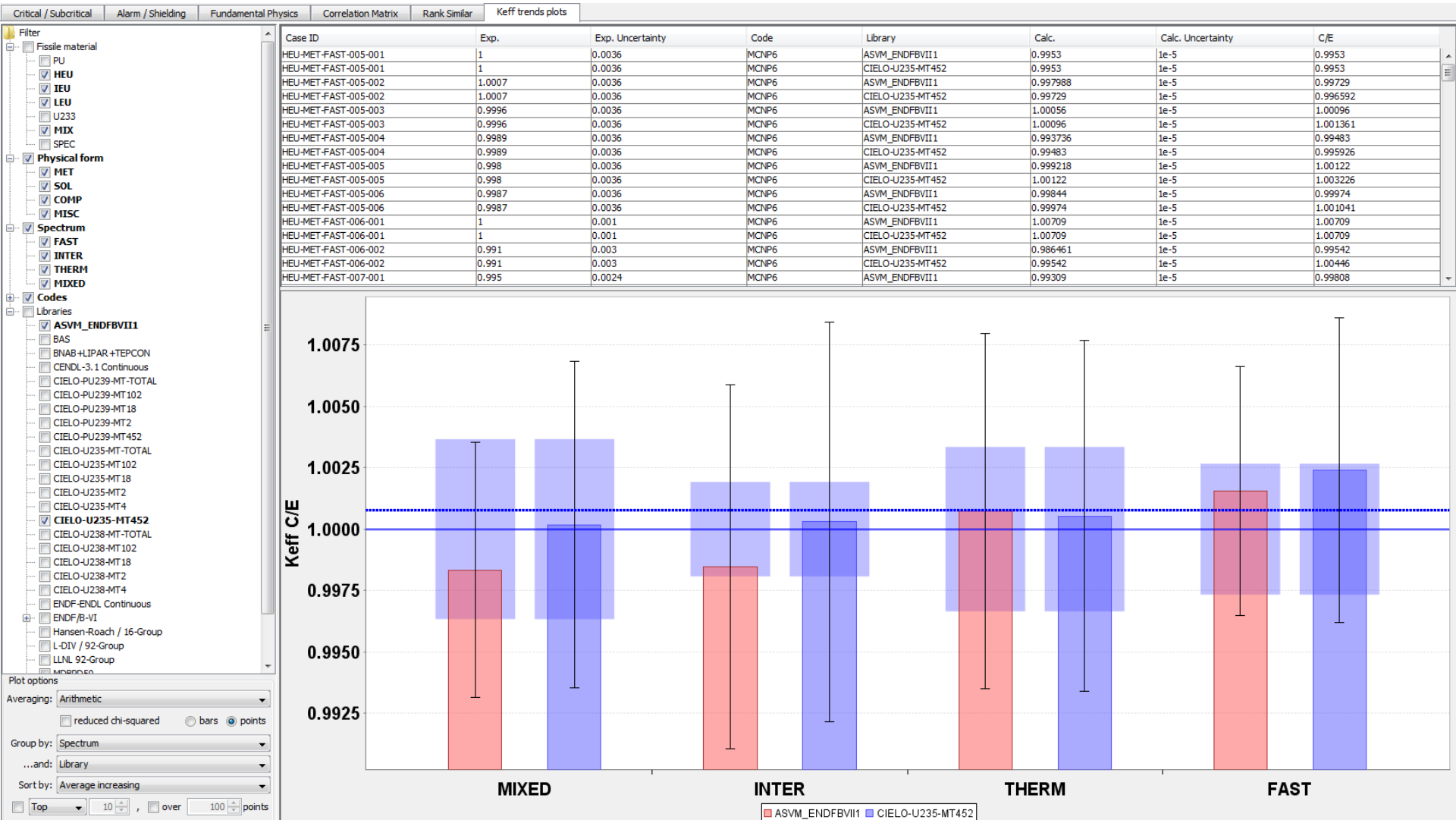
U235 MT102 CIELO/ENDFBVII.1



U235 MT452 CIELO/ENDFBVII.1



U235 MT452 CIELO/ENDFBVII.1



U235 TOTAL (sum MT2,MT4,MT18,MT102,MT452)

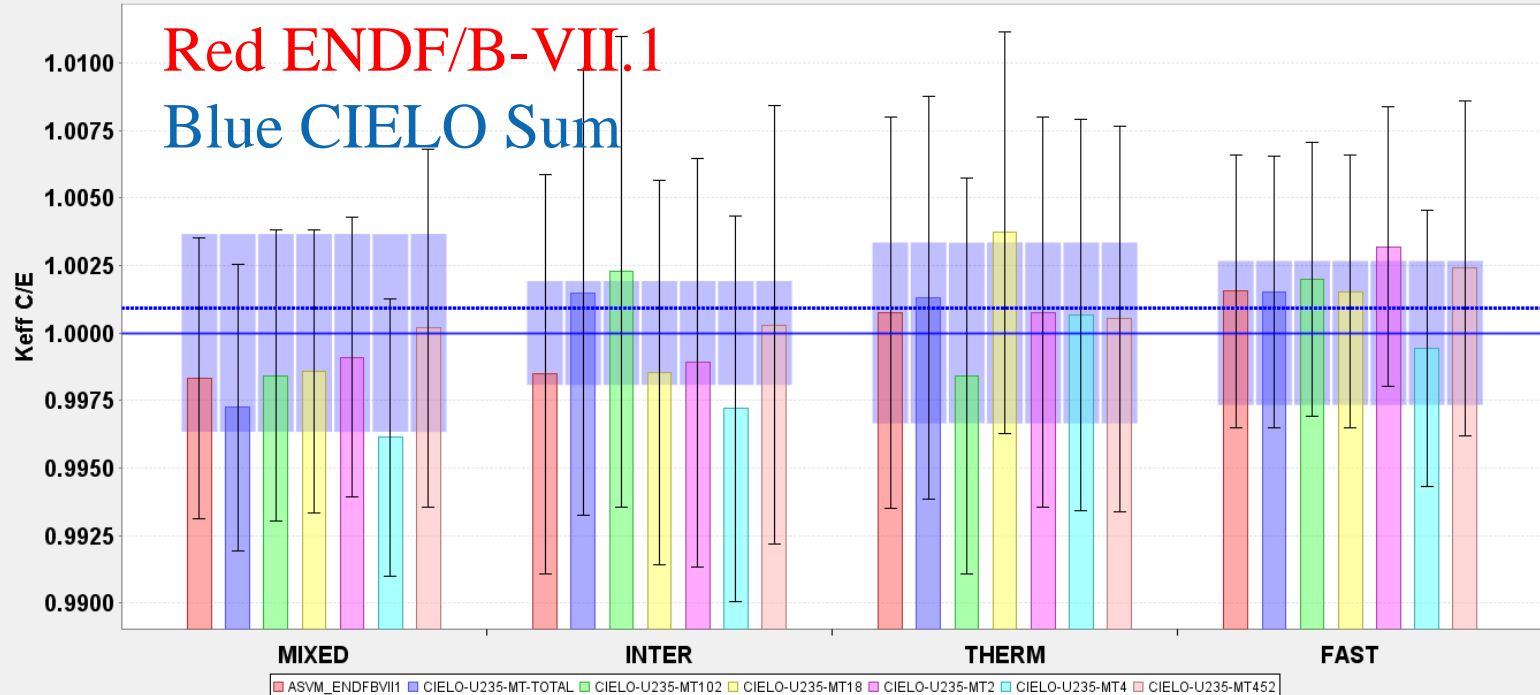
Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
 - Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB+LIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102

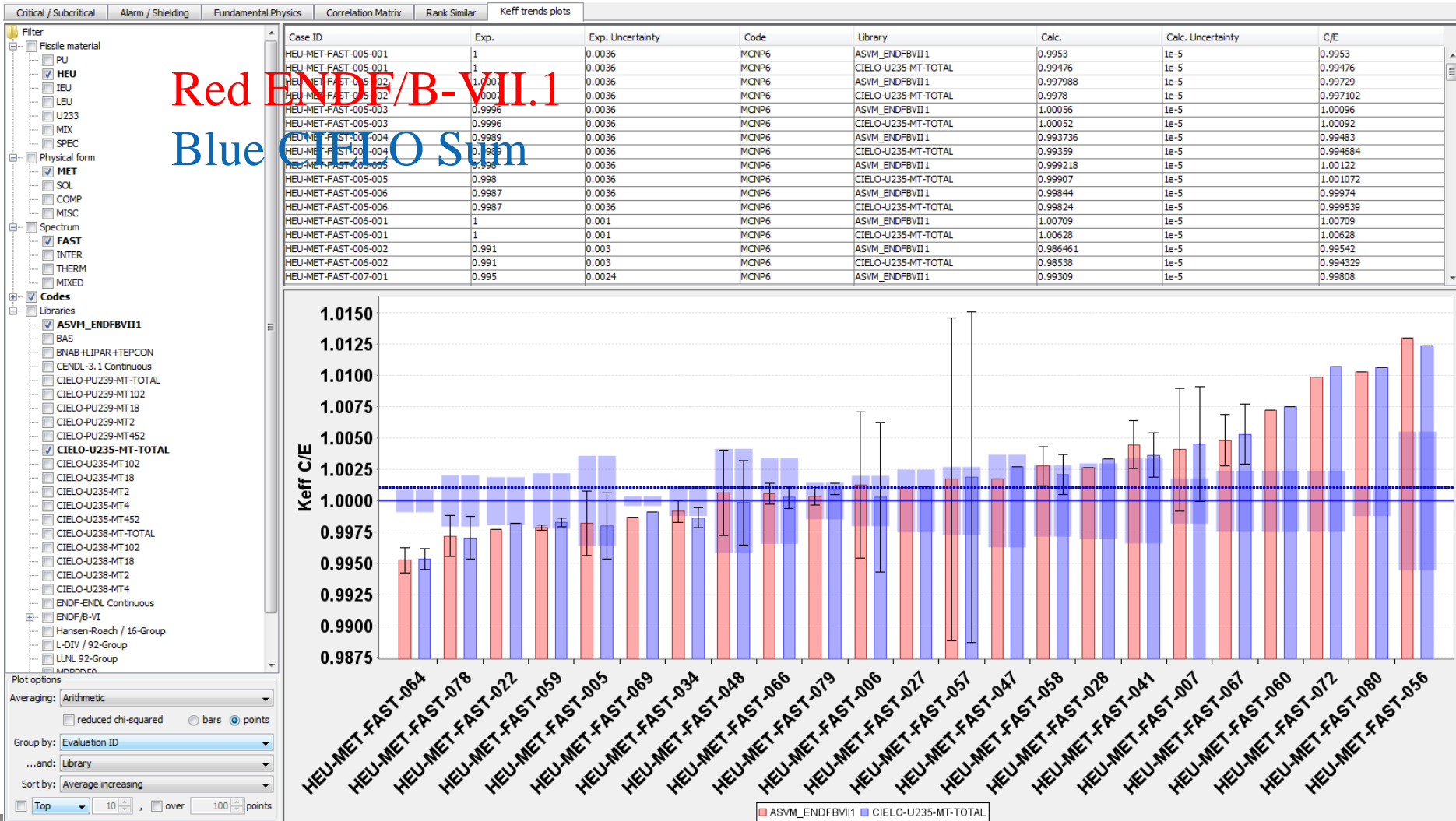
Plot opt
Averag
Group b
Sort b
To

MT2
MT4
MT18
MT102
MT452

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
HEU-MET-FAST-005-001	1	0.0036	MCNP6	ASVM_ENDFBVII1	0.9953	1e-5	0.9953
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U235-MT-TOTAL	0.99476	1e-5	0.99476
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U235-MT102	0.99531	1e-5	0.99531
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U235-MT18	0.9953	1e-5	0.9953
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U235-MT2	0.99672	1e-5	0.99672
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U235-MT4	0.99332	1e-5	0.99332
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U235-MT452	0.9953	1e-5	0.9953
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	ASVM_ENDFBVII1	0.997988	1e-5	0.99729
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U235-MT-TOTAL	0.9978	1e-5	0.997102
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U235-MT102	0.9987	1e-5	0.998001
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U235-MT18	0.99797	1e-5	0.997272
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U235-MT2	0.99921	1e-5	0.998511
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U235-MT4	0.99588	1e-5	0.995183
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U235-MT452	0.99729	1e-5	0.996592
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	ASVM_ENDFBVII1	1.00056	1e-5	1.00096
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	CIELO-U235-MT-TOTAL	1.00052	1e-5	1.00092
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	CIELO-U235-MT102	1.00163	1e-5	1.002031



U235 TOTAL for HMF (sum MT2,MT4,MT18,MT102,MT452)



U238

Available Materials

[Pu-239](#)
[U-238](#)
[U-235](#)
[Fe-56](#)
[O-16](#)
[H-1](#)
[Validation](#)

CIELO U-238 Project Coordinators: R.Capote, A. Trkov and O. Iwamoto

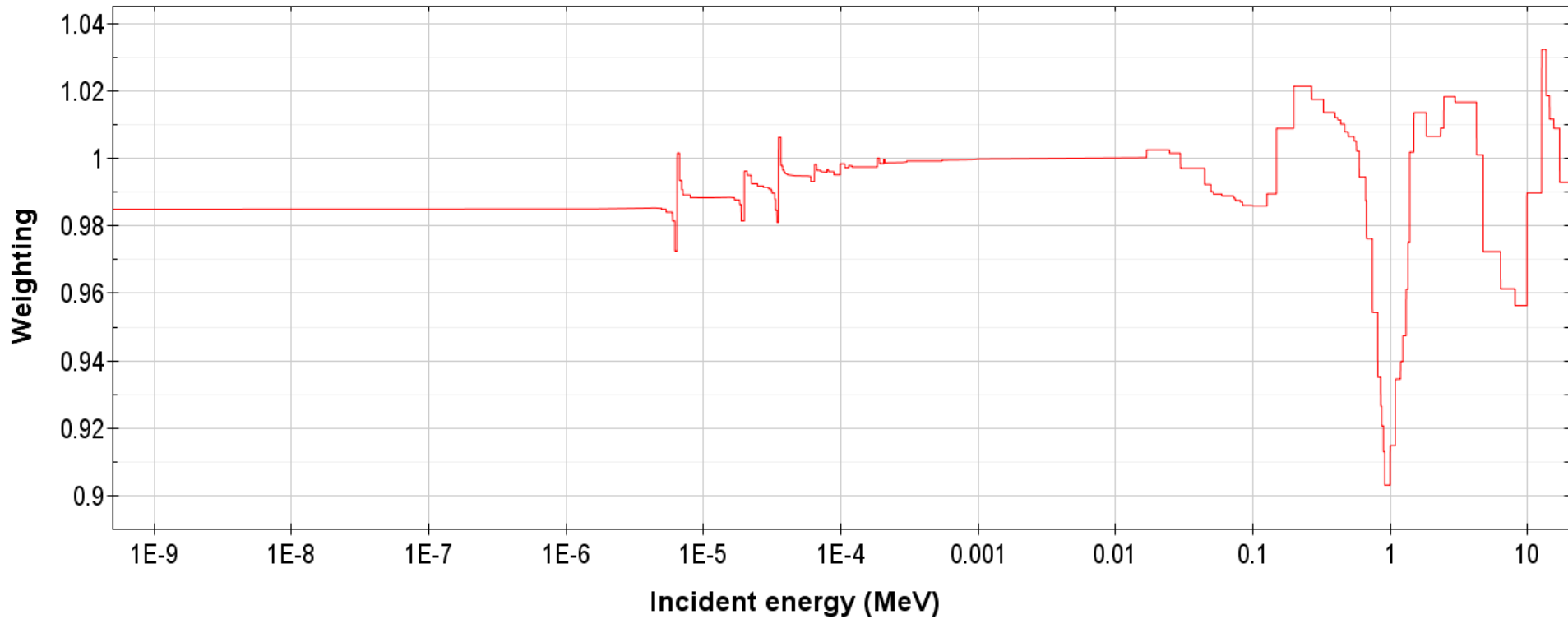
Data files available for downloading:

#	Version	Description	Format	Link	Documents
1	ib25	First trial (IAEA)	ENDF	zip	[1]
2			ACE	zip	
3	ib33	CIELO Starter File (IAEA)	ENDF	zip	[2,3,4,5,6]
4			ACE	zip	
5	ib36	Improved inelastic, (n,2n) (IAEA)	ENDF	zip	[7]
6			ACE	zip	
7	ib42	Refined OMP, Improved ang.distr. (IAEA)	ENDF	zip	
8			ACE	zip	
9	ib44	Improved HE (n,3n), (n,4n), (n,f) (IAEA)	ENDF	zip	
10			ACE	zip	
11	ib44rjFs	Fast: IAEA ib44, URR: IRMM, RRR: e71 with bound-levels by Kopecky, PFNS by Talou	ENDF	zip	
12			ACE	zip	
13	ib46rjFs	Fast: IAEA ib46, URR: IRMM, RRR: e71 with bound-levels by Kopecky, PFNS by Talou (corrected one tab in the comments, 20-Apr-2016)	ENDF	zip	
14			ACE	zip	(include heating, 20-Apr-2016)

u238ib46rjFs

	THERM	INTER	FAST	MIXED
IEU	22/180	6/21	15/43	0/23
LEU	472/1612	0/0	0/1	0/5
MIX	134/436	0/7	40/67	0/26

U238 MT2 CIELO/ENDFBVII.1



Integral experiments are generally insensitive

U238 MT2 CIELO/ENDFBVII.1

Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
 - Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB+LIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - Mendelev

Plot options

Averaging: Arithmetic

reduced chi-squared bars points

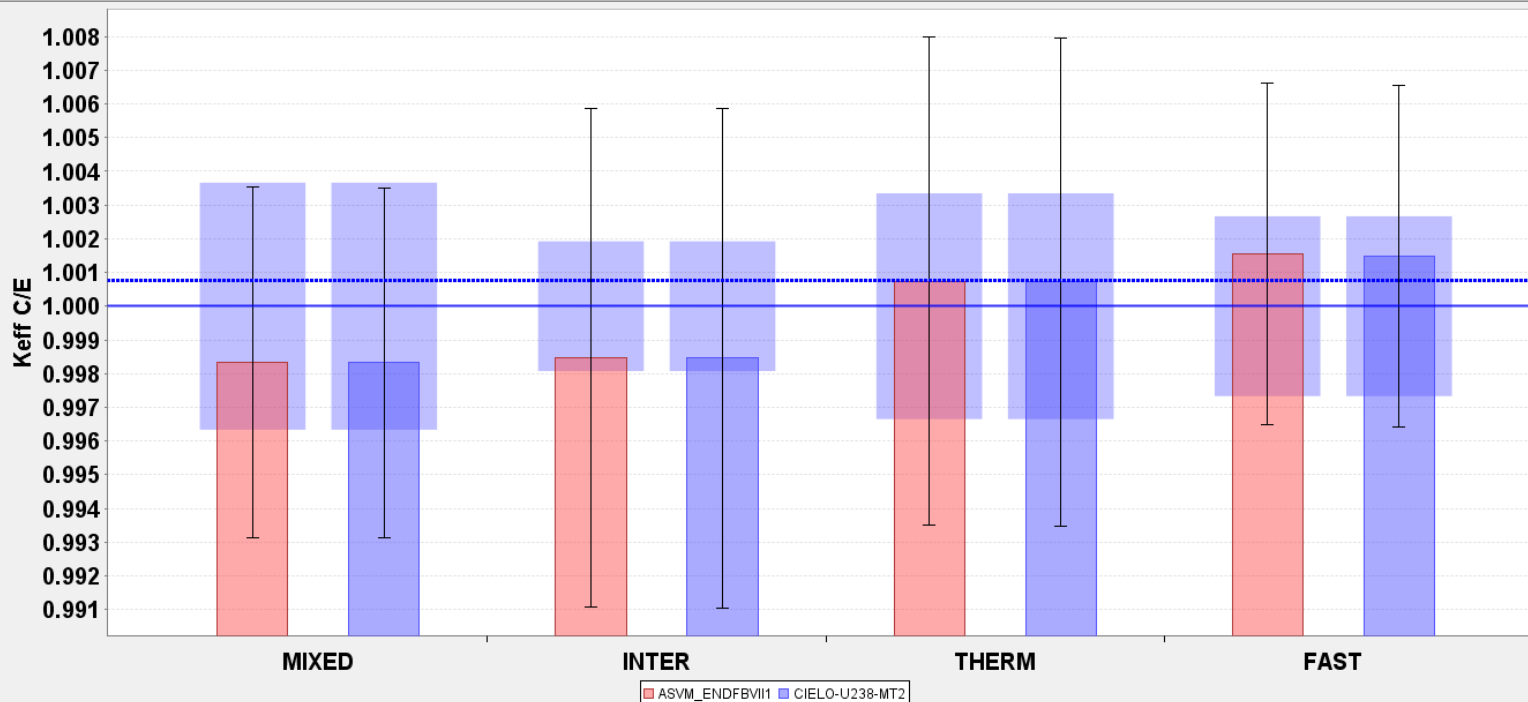
Group by: Spectrum

...and: Library

Sort by: Average increasing

Top 10 over 100 points

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
HEU-MET-FAST-005-001	1	0.0036	MCNP6	ASVM_ENDFBVII1	0.9953	1e-5	0.9953
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U238-MT2	0.99526	1e-5	0.99526
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	ASVM_ENDFBVII1	0.997988	1e-5	0.99729
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U238-MT2	0.99795	1e-5	0.997252
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	ASVM_ENDFBVII1	1.00056	1e-5	1.00096
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	CIELO-U238-MT2	1.00053	1e-5	1.00093
HEU-MET-FAST-005-004	0.9989	0.0036	MCNP6	ASVM_ENDFBVII1	0.993736	1e-5	0.99483
HEU-MET-FAST-005-004	0.9989	0.0036	MCNP6	CIELO-U238-MT2	0.99371	1e-5	0.994804
HEU-MET-FAST-005-005	0.998	0.0036	MCNP6	ASVM_ENDFBVII1	0.999218	1e-5	1.00122
HEU-MET-FAST-005-005	0.998	0.0036	MCNP6	CIELO-U238-MT2	0.99919	1e-5	1.001192
HEU-MET-FAST-005-006	0.9987	0.0036	MCNP6	ASVM_ENDFBVII1	0.99844	1e-5	0.99974
HEU-MET-FAST-005-006	0.9987	0.0036	MCNP6	CIELO-U238-MT2	0.99841	1e-5	0.99971
HEU-MET-FAST-006-001	1	0.001	MCNP6	ASVM_ENDFBVII1	1.00709	1e-5	1.00709
HEU-MET-FAST-006-001	1	0.001	MCNP6	CIELO-U238-MT2	1.00707	1e-5	1.00707
HEU-MET-FAST-006-002	0.991	0.003	MCNP6	ASVM_ENDFBVII1	0.986461	1e-5	0.99542
HEU-MET-FAST-006-002	0.991	0.003	MCNP6	CIELO-U238-MT2	0.98644	1e-5	0.995399
HEU-MET-FAST-007-001	0.995	0.0024	MCNP6	ASVM_ENDFBVII1	0.99309	1e-5	0.99808



U238 MT2 CIELO/ENDFBVII.1 LEU

Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
- Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB+LIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - Mendenhall

Plot options

Averaging: Arithmetic reduced chi-squared bars points

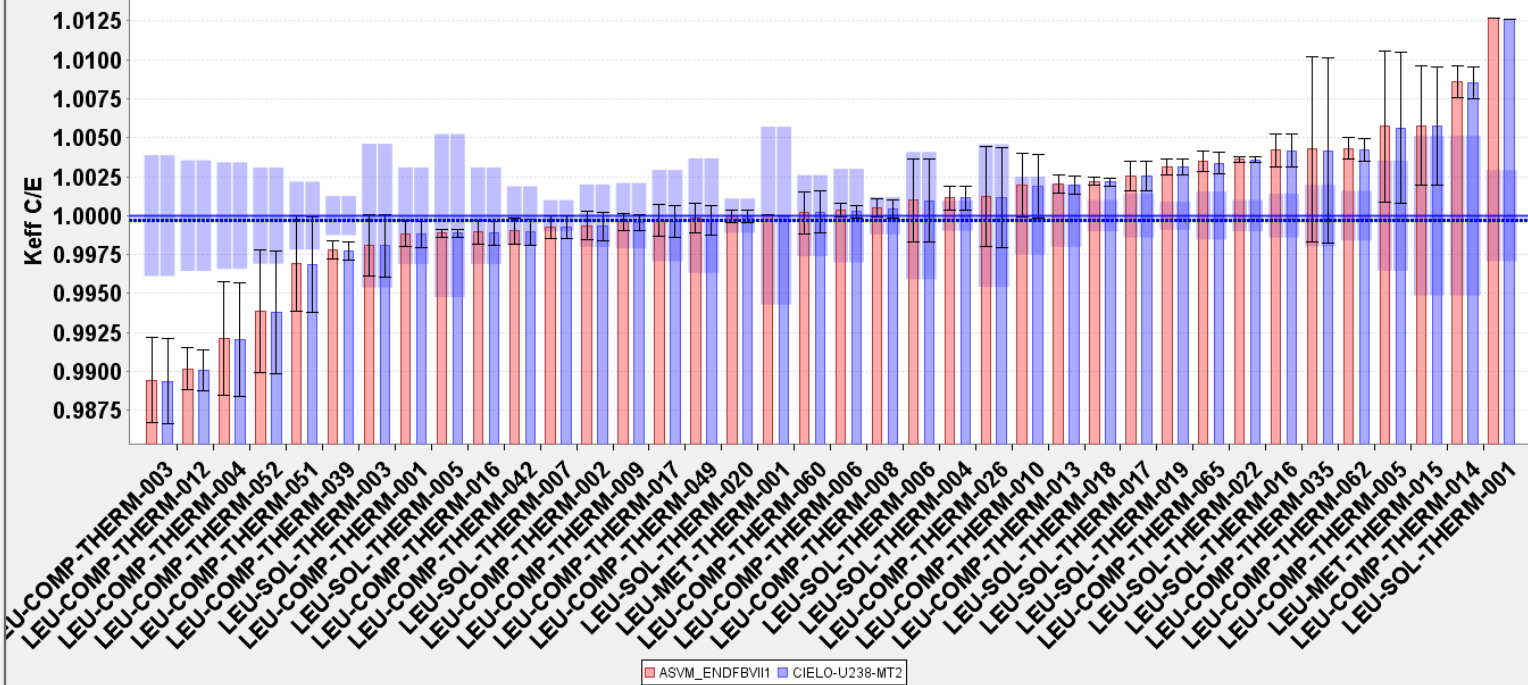
Group by: Evaluation ID

...and: Library

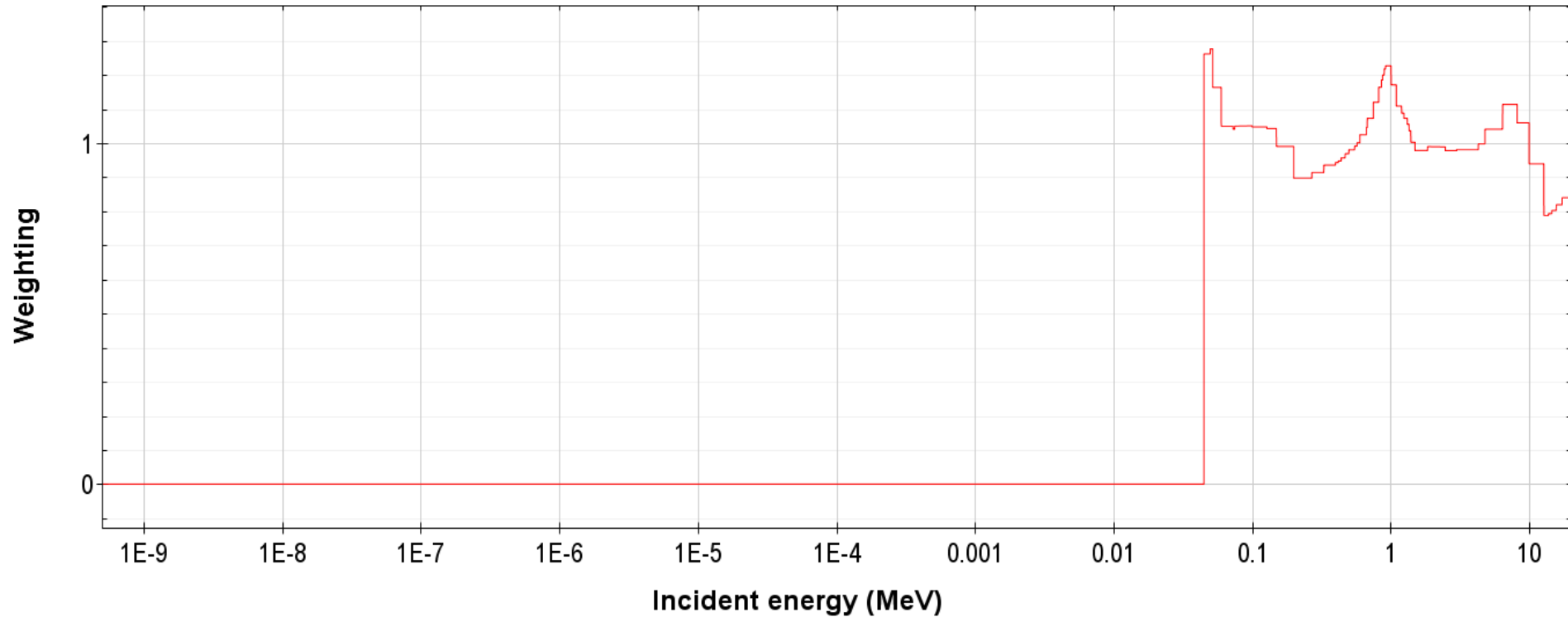
Sort by: Average increasing

Top 10 over 100 points

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
LEU-MET-THERM-001-001	0.999	0.0057	MCNP6	ASVM_ENDFBVII1	0.99904	1e-5	1.00004
LEU-MET-THERM-001-001	0.999	0.0057	MCNP6	CIELO-U238-MT2	0.99898	1e-5	0.99998
LEU-MET-THERM-015-001	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00146	1e-5	1.00146
LEU-MET-THERM-015-001	1	0.0051	MCNP6	CIELO-U238-MT2	1.00141	1e-5	1.00141
LEU-MET-THERM-015-002	1	0.0051	MCNP6	ASVM_ENDFBVII1	0.9961	1e-5	0.9961
LEU-MET-THERM-015-002	1	0.0051	MCNP6	CIELO-U238-MT2	0.99605	1e-5	0.99605
LEU-MET-THERM-015-003	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00381	1e-5	1.00381
LEU-MET-THERM-015-003	1	0.0051	MCNP6	CIELO-U238-MT2	1.00377	1e-5	1.00377
LEU-MET-THERM-015-004	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00095	1e-5	1.00095
LEU-MET-THERM-015-004	1	0.0051	MCNP6	CIELO-U238-MT2	1.00091	1e-5	1.00091
LEU-MET-THERM-015-005	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00047	1e-5	1.00047
LEU-MET-THERM-015-005	1	0.0051	MCNP6	CIELO-U238-MT2	1.00043	1e-5	1.00043
LEU-MET-THERM-015-006	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00087	1e-5	1.00087
LEU-MET-THERM-015-006	1	0.0051	MCNP6	CIELO-U238-MT2	1.00083	1e-5	1.00083
LEU-MET-THERM-015-007	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00003	1e-5	1.00003
LEU-MET-THERM-015-007	1	0.0051	MCNP6	CIELO-U238-MT2	0.99999	1e-5	0.99999
LEU-MET-THERM-015-008	1	0.0051	MCNP6	ASVM_ENDFBVII1	1.00811	1e-5	1.00811



U238 MT4 CIELO/ENDFBVII.1



Integral experiments are generally insensitive

U238 MT4 CIELO/ENDFBVII.1

Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
- Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB-4LIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - MUSEP-92

Plot options

Averaging: Arithmetic

reduced chi-squared bars points

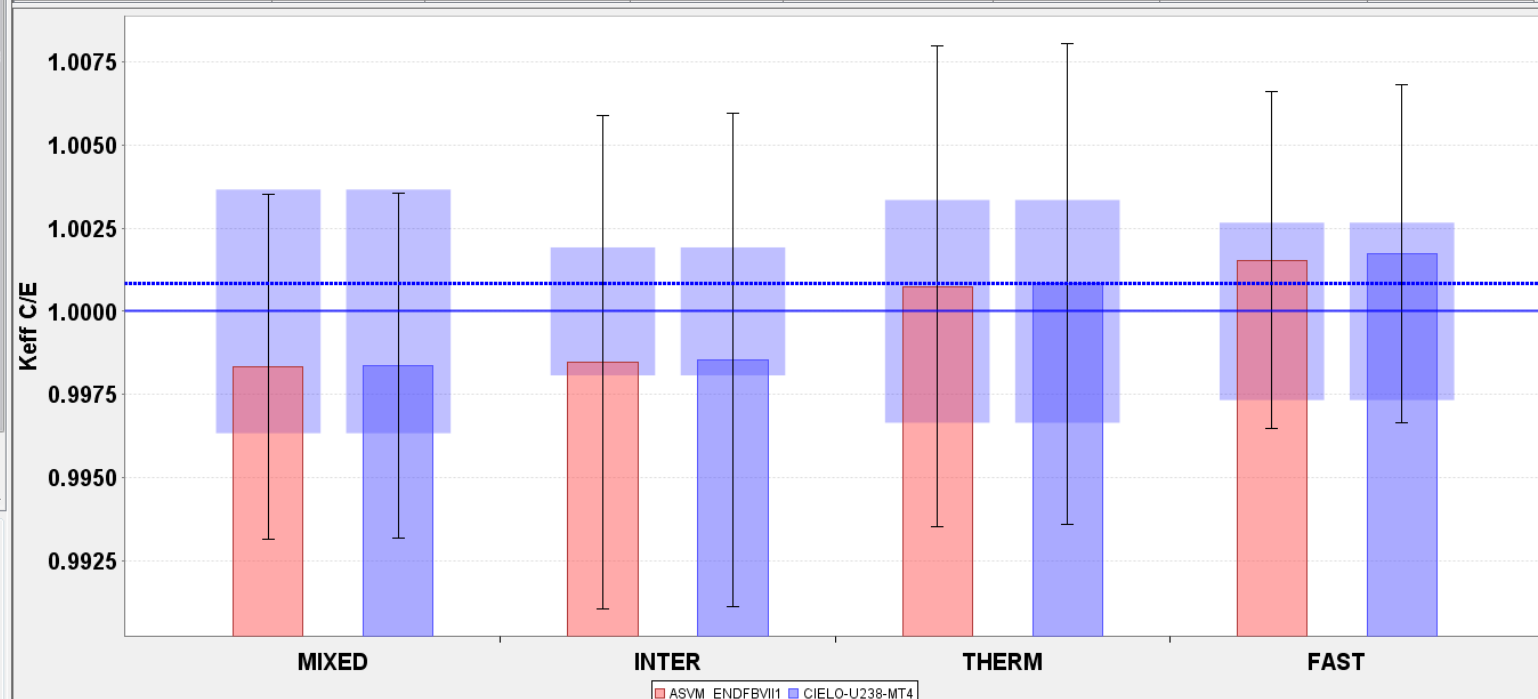
Group by: Spectrum

...and: Library

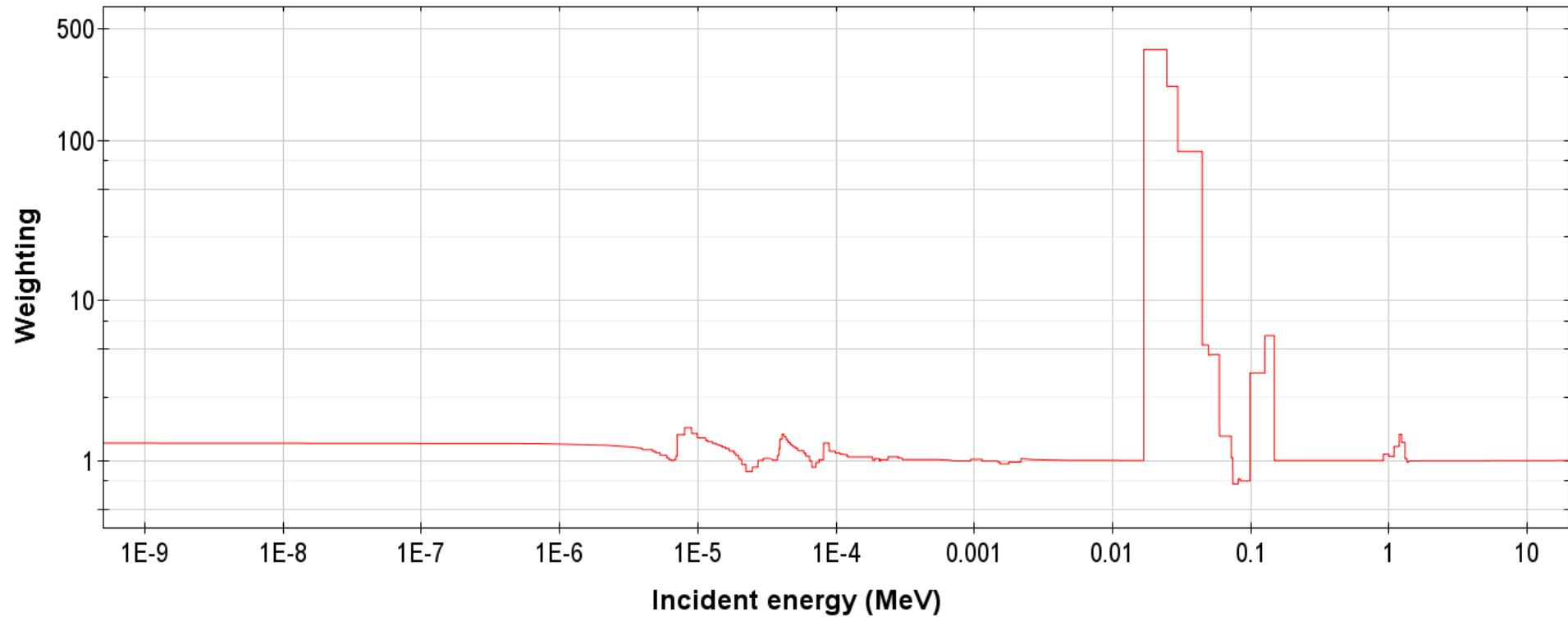
Sort by: Average increasing

Top 10 over 100 points

Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
HEU-MET-FAST-005-001	1	0.0036	MCNP6	ASVM_ENDFBVII1	0.9953	1e-5	0.9953
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U238-MT4	0.99544	1e-5	0.99544
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	ASVM_ENDFBVII1	0.997988	1e-5	0.99729
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U238-MT4	0.99812	1e-5	0.997422
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	ASVM_ENDFBVII1	1.00056	1e-5	1.00096
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	CIELO-U238-MT4	1.00068	1e-5	1.00108
HEU-MET-FAST-005-004	0.9989	0.0036	MCNP6	ASVM_ENDFBVII1	0.993736	1e-5	0.99483
HEU-MET-FAST-005-004	0.9989	0.0036	MCNP6	CIELO-U238-MT4	0.99385	1e-5	0.994944
HEU-MET-FAST-005-005	0.998	0.0036	MCNP6	ASVM_ENDFBVII1	0.999218	1e-5	1.00122
HEU-MET-FAST-005-005	0.998	0.0036	MCNP6	CIELO-U238-MT4	0.99934	1e-5	1.001343
HEU-MET-FAST-005-006	0.9987	0.0036	MCNP6	ASVM_ENDFBVII1	0.99844	1e-5	0.99974
HEU-MET-FAST-005-006	0.9987	0.0036	MCNP6	CIELO-U238-MT4	0.99857	1e-5	0.99987
HEU-MET-FAST-006-001	1	0.001	MCNP6	ASVM_ENDFBVII1	1.00709	1e-5	1.00709
HEU-MET-FAST-006-001	1	0.001	MCNP6	CIELO-U238-MT4	1.00715	1e-5	1.00715
HEU-MET-FAST-006-002	0.991	0.003	MCNP6	ASVM_ENDFBVII1	0.986461	1e-5	0.99542
HEU-MET-FAST-006-002	0.991	0.003	MCNP6	CIELO-U238-MT4	0.98652	1e-5	0.995479
HEU-MET-FAST-007-001	0.995	0.0024	MCNP6	ASVM_ENDFBVII1	0.99309	1e-5	0.99808



U238 MT18 CIELO/ENDFBVII.1



Raises IEU benchmarks up to + 300 pcm
Other benchmarks are mostly not impacted

U238 MT18 CIELO/ENDFBVII.1

Filter

- Fissile material
 - PU
 - HEU
 - IEU
 - LEU
 - U233
 - MIX
 - SPEC
- Physical form
 - MET
 - SOL
 - COMP
 - MISC
- Spectrum
 - FAST
 - INTER
 - THERM
 - MIXED
- Codes
- Libraries
 - ASVM_ENDFBVII1
 - BAS
 - BNAB-HLIPAR+TEPCON
 - CENDL-3.1 Continuous
 - CIELO-PU239-MT-TOTAL
 - CIELO-PU239-MT102
 - CIELO-PU239-MT18
 - CIELO-PU239-MT2
 - CIELO-PU239-MT452
 - CIELO-U235-MT-TOTAL
 - CIELO-U235-MT102
 - CIELO-U235-MT18
 - CIELO-U235-MT2
 - CIELO-U235-MT4
 - CIELO-U235-MT452
 - CIELO-U238-MT-TOTAL
 - CIELO-U238-MT102
 - CIELO-U238-MT18
 - CIELO-U238-MT2
 - CIELO-U238-MT4
 - ENDF-ENDL Continuous
 - ENDF/B-VI
 - Hansen-Roach / 16-Group
 - L-DIV / 92-Group
 - LLNL 92-Group
 - mpenno

Plot options

Averaging: Arithmetic

reduced chi-squared bars points

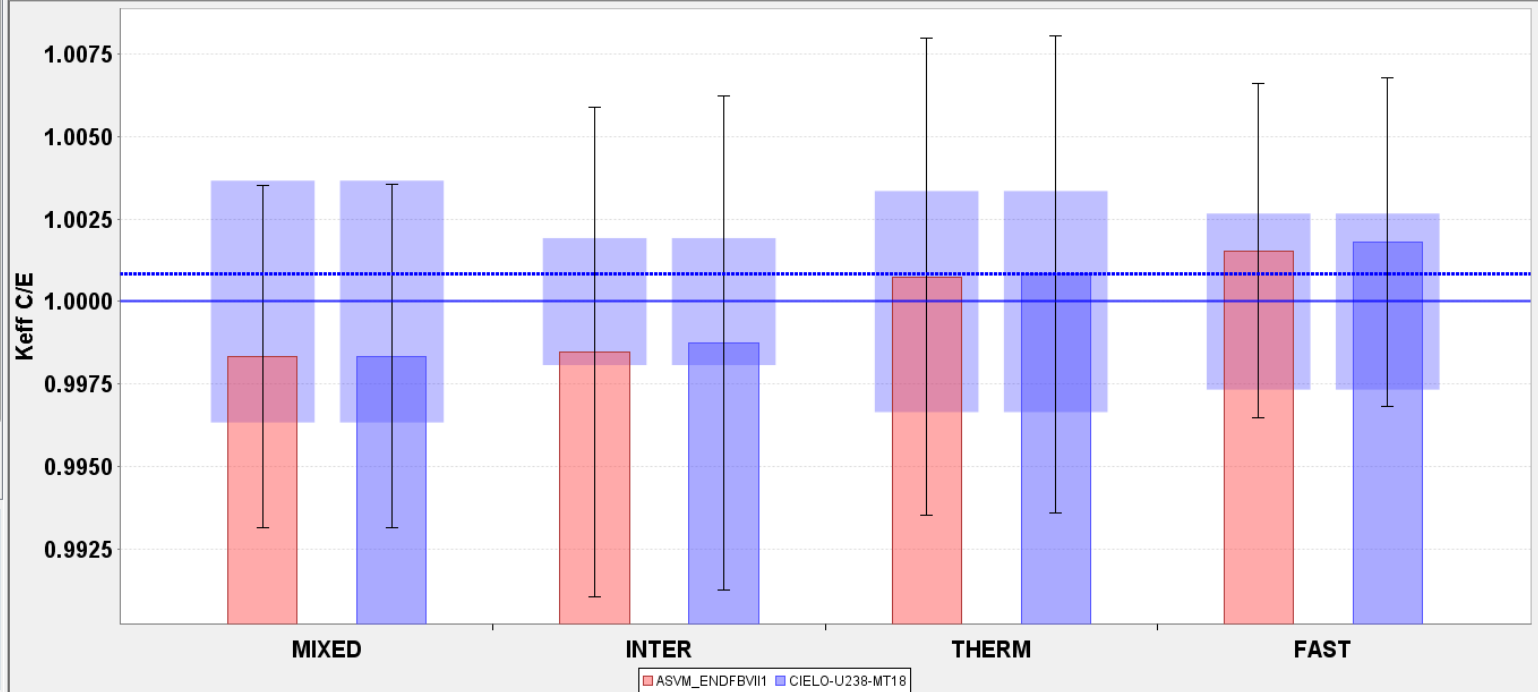
Group by: Spectrum

...and: Library

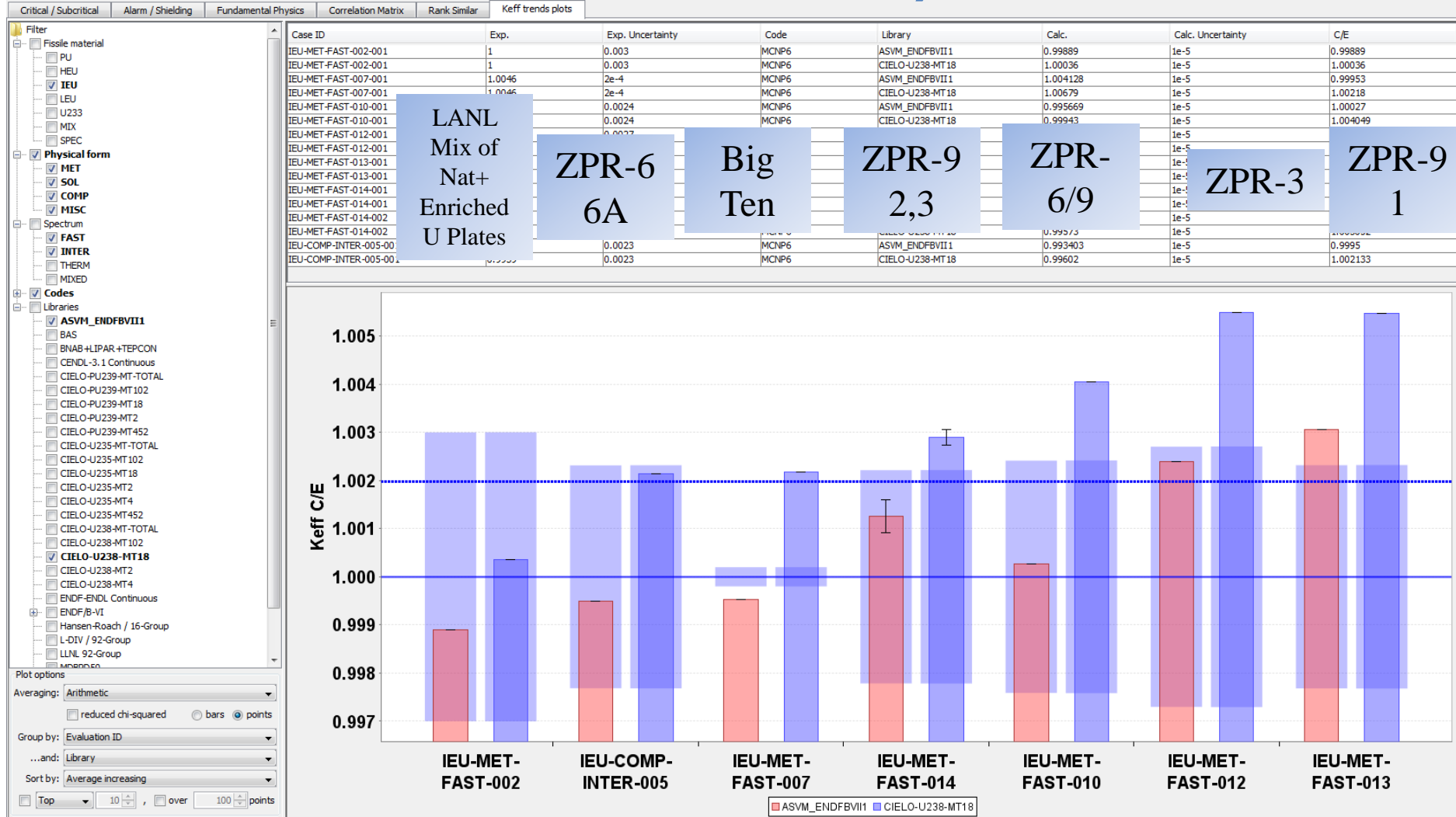
Sort by: Average increasing

Top 10 over 100 points

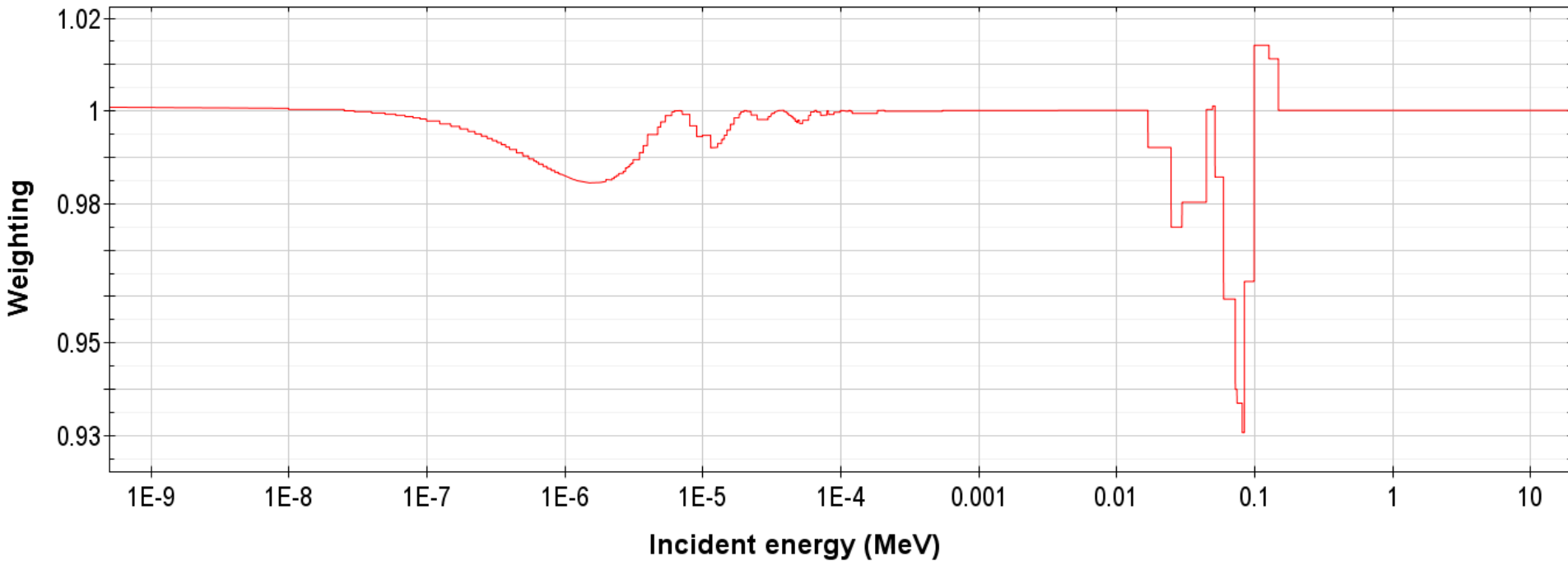
Case ID	Exp.	Exp. Uncertainty	Code	Library	Calc.	Calc. Uncertainty	C/E
HEU-MET-FAST-005-001	1	0.0036	MCNP6	ASVM_ENDFBVII1	0.9953	1e-5	0.9953
HEU-MET-FAST-005-001	1	0.0036	MCNP6	CIELO-U238-MT18	0.99534	1e-5	0.99534
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	ASVM_ENDFBVII1	0.997988	1e-5	0.99729
HEU-MET-FAST-005-002	1.0007	0.0036	MCNP6	CIELO-U238-MT18	0.99802	1e-5	0.997322
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	ASVM_ENDFBVII1	1.00056	1e-5	1.00096
HEU-MET-FAST-005-003	0.9996	0.0036	MCNP6	CIELO-U238-MT18	1.00059	1e-5	1.00099
HEU-MET-FAST-005-004	0.9989	0.0036	MCNP6	ASVM_ENDFBVII1	0.993736	1e-5	0.99483
HEU-MET-FAST-005-004	0.9989	0.0036	MCNP6	CIELO-U238-MT18	0.99377	1e-5	0.994864
HEU-MET-FAST-005-005	0.998	0.0036	MCNP6	ASVM_ENDFBVII1	0.999218	1e-5	1.00122
HEU-MET-FAST-005-005	0.998	0.0036	MCNP6	CIELO-U238-MT18	0.99925	1e-5	1.001253
HEU-MET-FAST-005-006	0.9987	0.0036	MCNP6	ASVM_ENDFBVII1	0.99844	1e-5	0.99974
HEU-MET-FAST-005-006	0.9987	0.0036	MCNP6	CIELO-U238-MT18	0.99848	1e-5	0.99978
HEU-MET-FAST-006-001	1	0.001	MCNP6	ASVM_ENDFBVII1	1.00709	1e-5	1.00709
HEU-MET-FAST-006-001	1	0.001	MCNP6	CIELO-U238-MT18	1.00711	1e-5	1.00711
HEU-MET-FAST-006-002	0.991	0.003	MCNP6	ASVM_ENDFBVII1	0.986461	1e-5	0.99542
HEU-MET-FAST-006-002	0.991	0.003	MCNP6	CIELO-U238-MT18	0.98648	1e-5	0.995439
HEU-MET-FAST-007-001	0.995	0.0024	MCNP6	ASVM_ENDFBVII1	0.99309	1e-5	0.99808



U238 MT18 CIELO/ENDFBVII.1 (IEU-INTER/FAST)

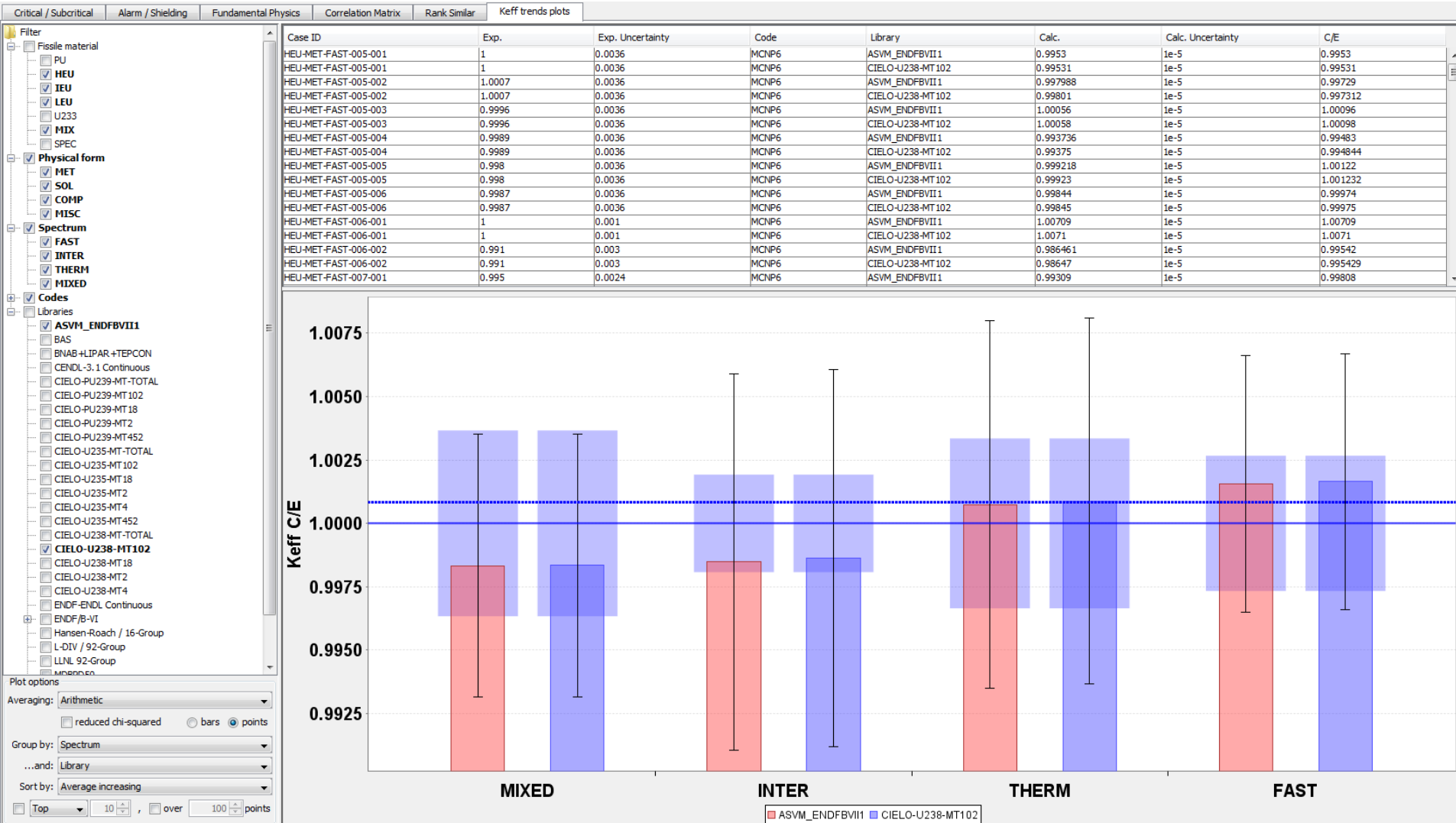


U238 MT102 CIELO/ENDFBVII.1

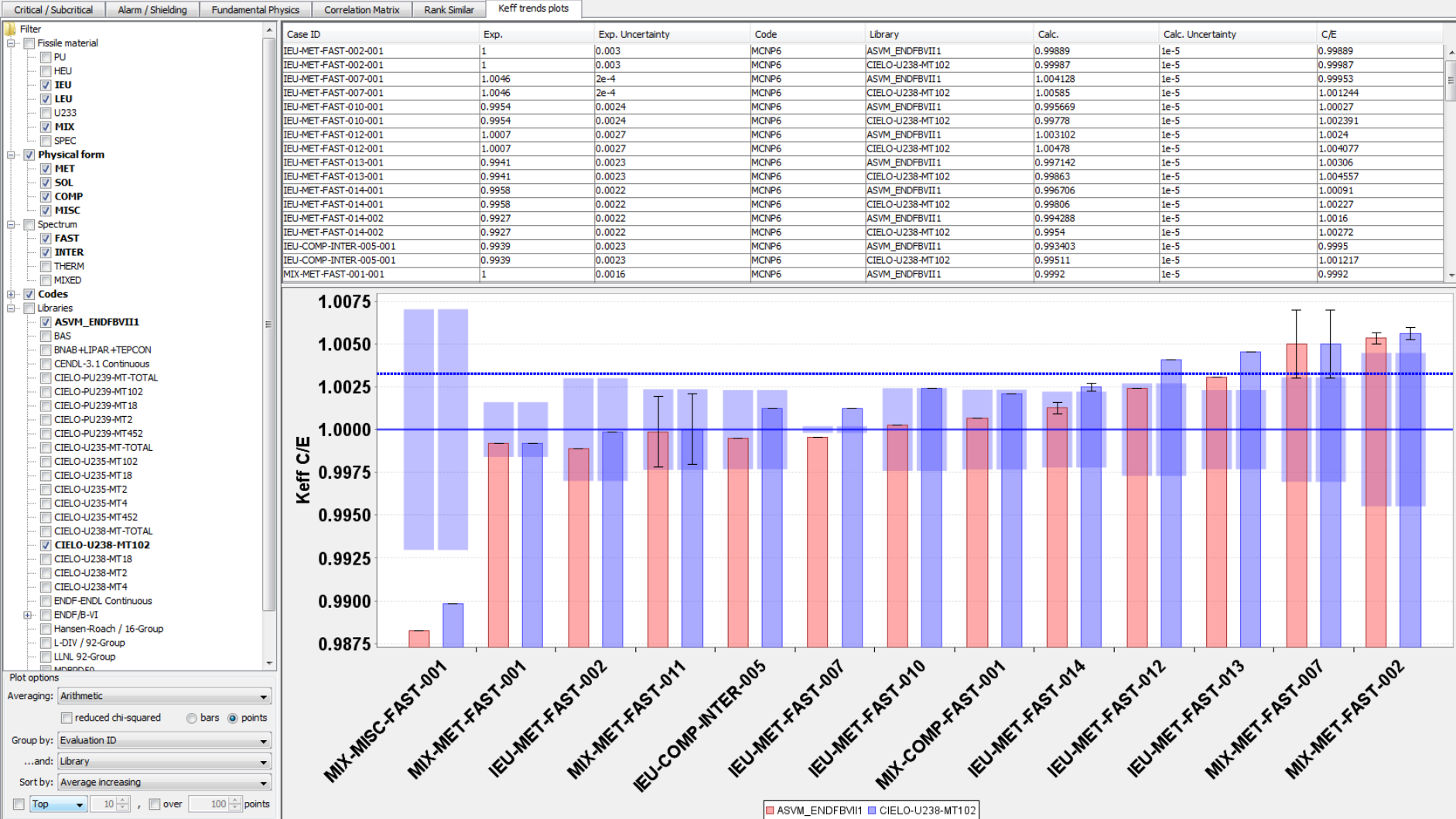


Raises IEU benchmarks up to + 150 pcm
Other benchmarks are mostly not impacted

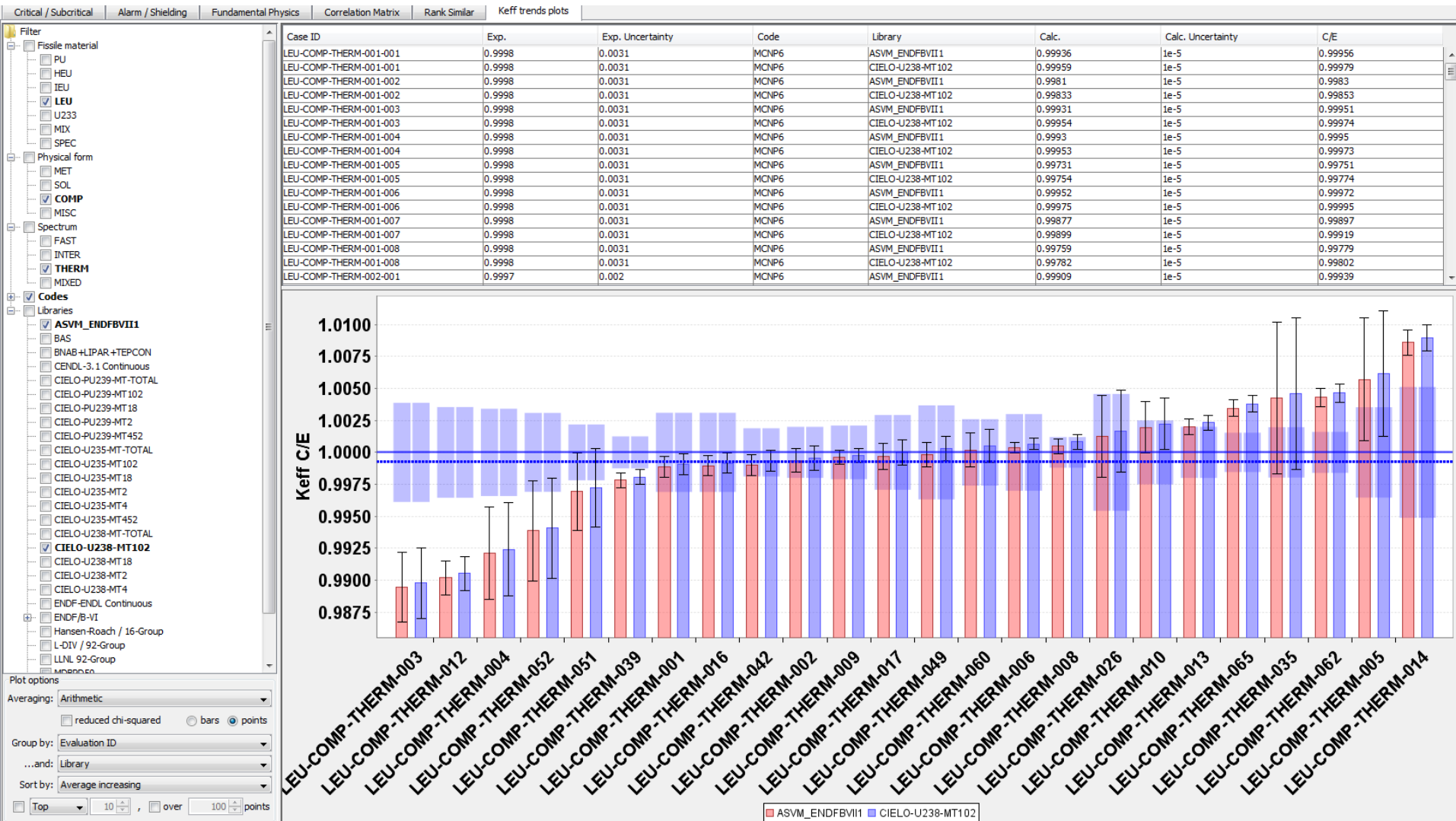
U238 MT102 CIELO/ENDFBVII.1



U238 MT102 CIELO/ENDFBVII.1 (FAST/INTER)



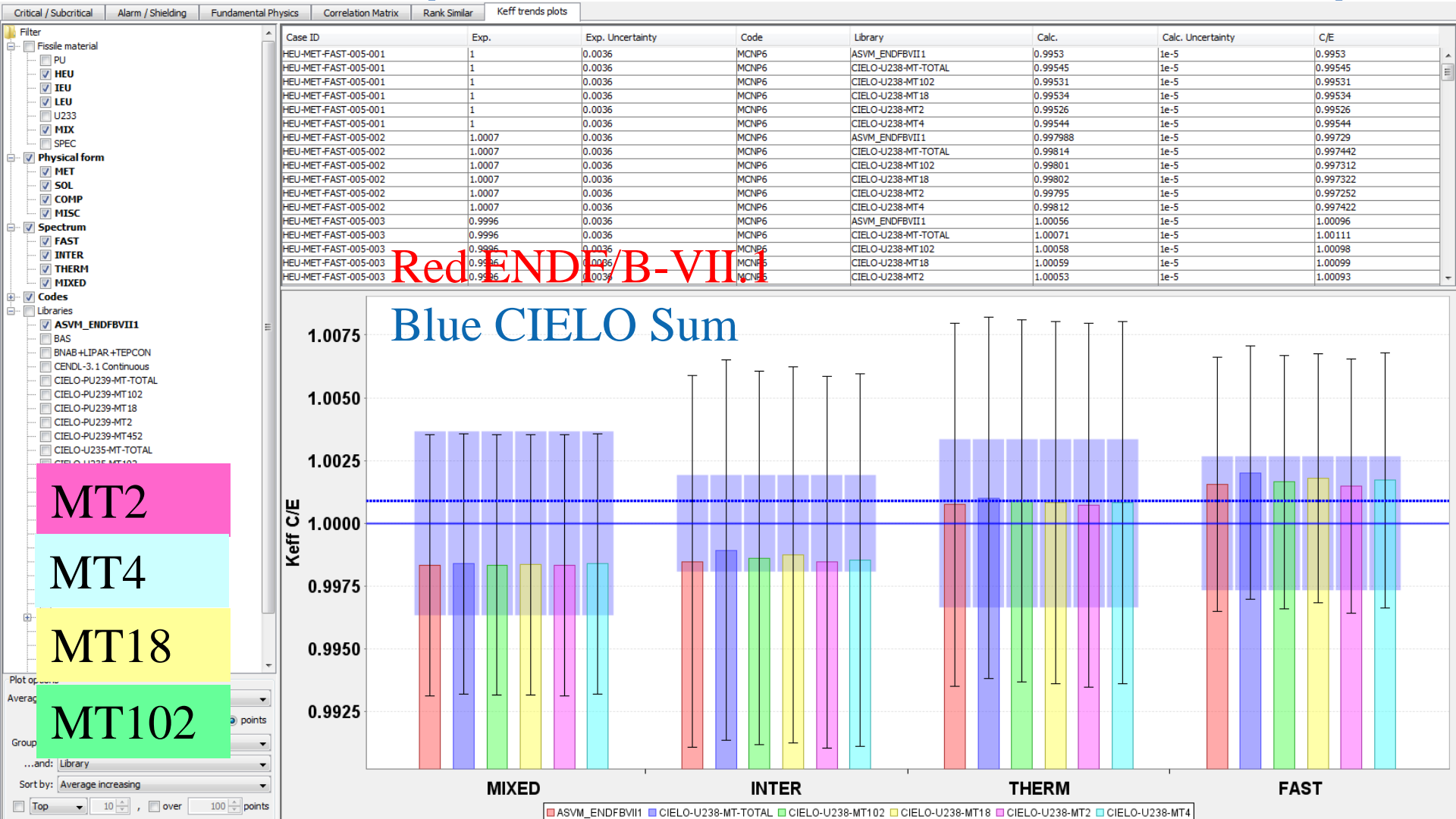
U238 MT102 CIELO/ENDFBVII.1 LCT



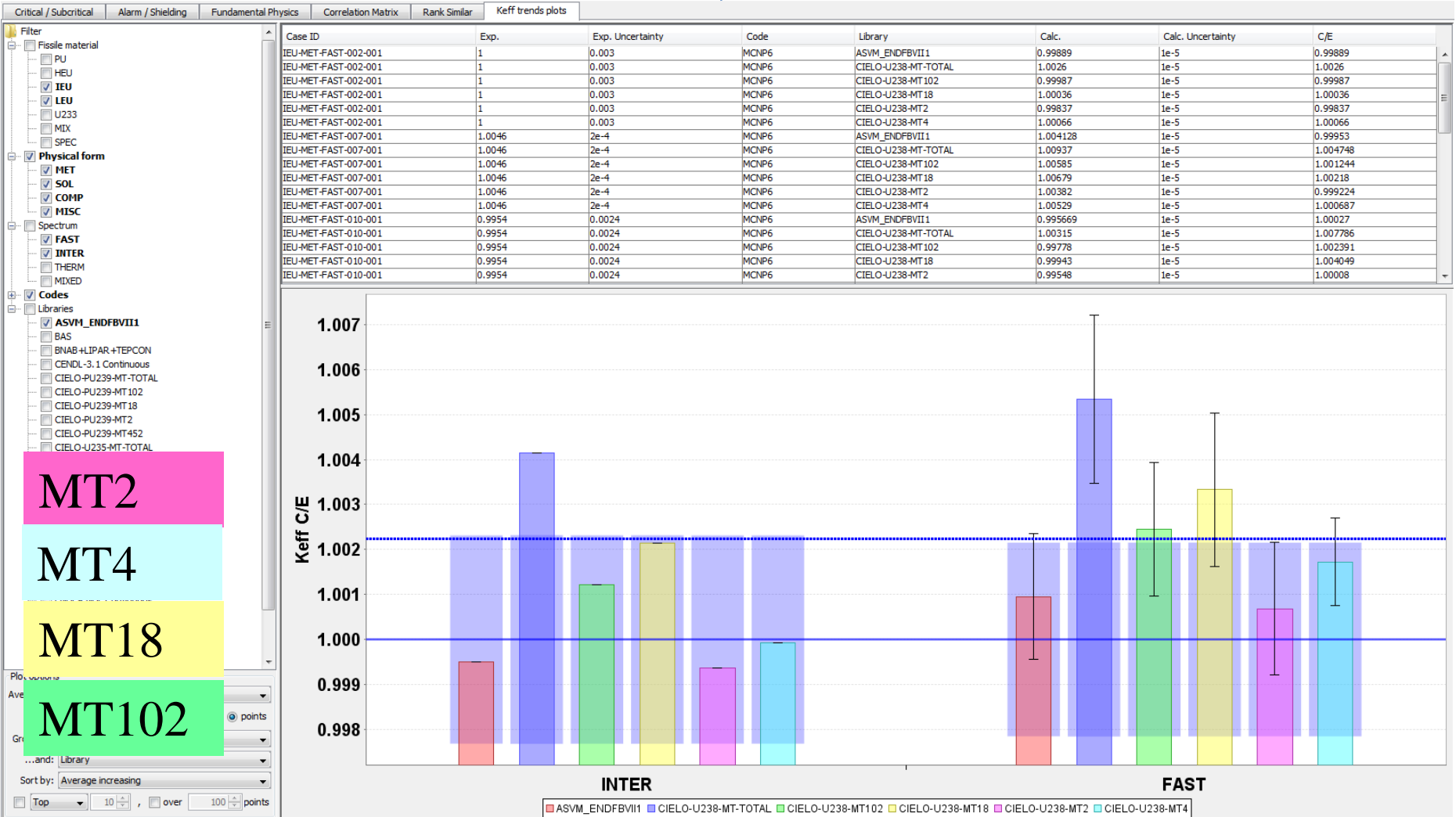
U238 MT452 CIELO/ENDFBVII.1

No Difference

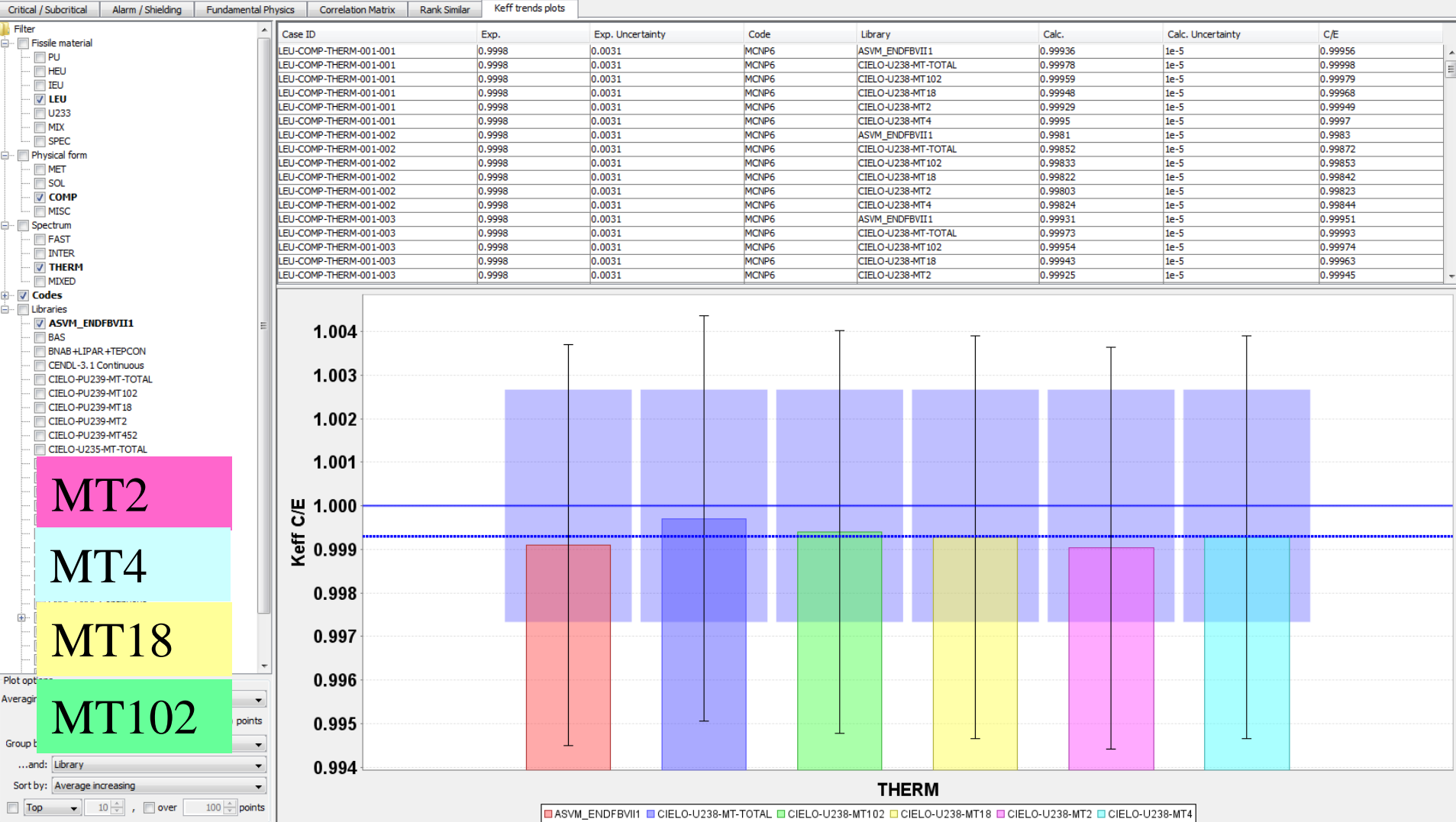
U238 Total (MT2,MT4,MT18,MT102,MT452)



Total (MT2,MT4,MT18,MT102) IEU and LEU, INTER/FAST



Total (MT2,MT4,MT18,MT102) LCT



*Avoiding with current
NDaST
[large angular data]*

Fe56

016

H1

Conclusion

- Impact of individual changes to MT2,MT4,MT18,MT102,MT452 were tested for Pu239, U235, U238
- Relatively quick (~1 day of effort), automation could/will be improved
- Method could be used by anyone (although training would be required probably)
- Meant to supplement not replace direct perturbation testing!
- <http://www.oecd-nea.org/ndast/>

Contact

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OECD / NEA Data Bank
ndast@oecd-nea.org