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# Status of CEA Activities in SG33

**Revised Results on :**  
**Initial Covariances**  
**Benchmark calculations**  
**Adjustment results**

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# CEA Activities in SG33

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## Benchmarks calculations

- Neutronic Codes : ERANOS/PARIS → Ecco+Sn2-3d + **NEW** Corrective Factors with Jeff3.1.1
- Sensitivities to Cross Sections, Nu and Chi
- Benchmark C/E-1
- Experimental uncertainties from literature + No Correlations
- No Analytical modelling covariances used for time being

## Adjustment Procedure

- Made in the **Conrad** framework → classical multigroup adjustment (AMERE,RDN)
- Allows initial cross correlations between isotopes/reactions/experiments

# CEA Activities in SG33

Preliminary Initial Covariances → Near Futur a new set



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- O16, Ni58, Pu241 → JENDL4
- Cr52, Pu240 → TENDL09

+

First CEA Cadarache Evaluation\*

No  $\chi$ ,  $\nu$ , ...

- Na23 Full Evaluation with CONRAD/TALYS
- U238 } Marginalisation with CONRAD/TALYS
- Pu239 }
- Fe56 } Integral Experiment Feed Back + Expertise
- U235 }

\*Preliminary Results

## CEA Activities in SG33 : Previous Results



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Experiment	Uncertainty(%)	Initial C/E-1	Uncertainty(%)	Final C/E-1	Uncertainty(%)
Jezebel_Keff	0.2	-0.316	2.31752	-0.0499578	0.175027
Jezebel_F28_F25	1.075	-2.454	9.03732	0.433292	0.743628
Jezebel_F37_F25	1.455	-0.381	1.76317	0.215235	0.630401
Jezebel_F49_F25	0.898	-0.846	3.66319	0.251869	0.640917
Jezebel_Pu240_Keff	0.2	0.066	2.01585	0.0723908	0.178877
FlatTop_Keff	0.3	-0.524	2.90919	0.107902	0.27676
FlatTop_F28_F25	1.112	-3.109	9.67772	-0.20325	0.753497
FlatTop_F37_F25	1.402	-2.943	1.98863	-2.29789	0.59439
ZPR6_7_Keff	0.23	0.207	1.95944	<b>0.297658</b>	0.110772
ZPR6_7_F49_F25	2.1	-3.92	3.40029	-2.61118	0.766018
ZPR6_7_F28_F25	3	-4.736	11.8807	-0.844321	1.38728
ZPR6_7_C28_F25	2.4	1.097	3.78164	<b>1.58409</b>	1.07071
ZPR6_7_Pu240_Keff	0.22	0.164	1.93091	<b>0.237559</b>	0.114277
ZPPR9_Keff	0.154	-0.321	2.03919	-0.154402	0.115134
ZPPR9_F28_F25	2.76	-10.82	3.50493	-4.8864	1.97467
ZPPR9_F49_F25	1.99	-3.665	3.34021	-2.4387	0.781883
ZPPR9_C28_F25	1.885	1.005	3.66701	<b>1.50087</b>	1.05819
ZPPR9_NaV_S3	1.225	3.734	6.87397	<b>5.50529</b>	0.77203
ZPPR9_NaV_S5	1.136	-7.765	9.36986	-3.53843	0.953399
Joyo_Keff	0.18	-1.008	1.14258	-0.175179	0.167775

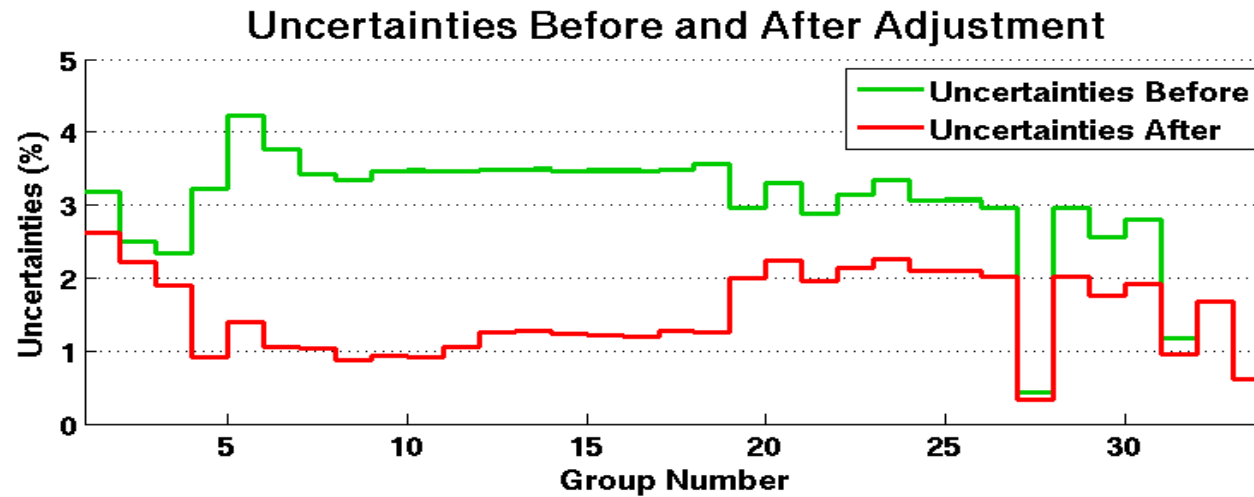
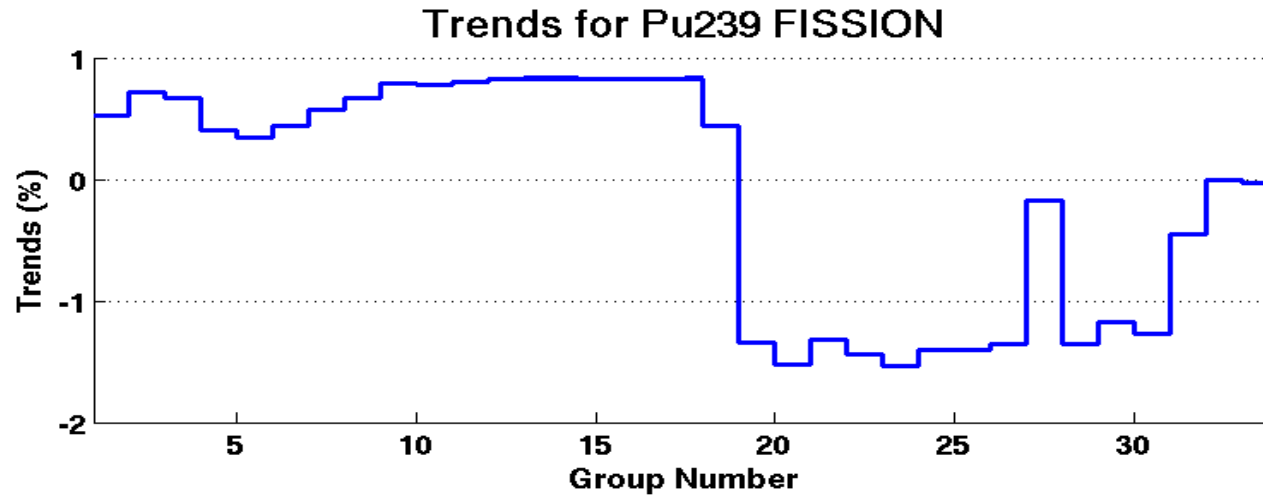
## CEA Activities in SG33 : Revised Results



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Experiment	Uncertainty(%)	Initial C/E-1	Uncertainty(%)	Final C/E-1	Uncertainty(%)
Jezebel_Keff	0.2	-0.3164	2.31752	-0.0485113	0.174754
Jezebel_F28_F25	1.1	-2.134	9.03732	0.415708	0.748406
Jezebel_F37_F25	0.9	-1.721	3.66319	0.542655	0.63855
Jezebel_F49_F25	1.4	-2.559	1.76317	-0.739924	0.624956
Jezebel_Pu240_Keff	0.2	0.06589	2.01585	0.0549387	0.178856
FlatTop_Keff	0.3	-0.6711	2.90919	-0.0110289	0.276132
FlatTop_F28_F25	1.1	-3.109	9.67772	-0.635708	0.756205
FlatTop_F37_F25	1.4	-2.943	1.98863	-1.19051	0.590293
ZPR6_7_Keff	0.2299	0.4488	1.95944	0.321108	0.0973647
ZPR6_7_F49_F25	3	-1.732	11.8807	1.13045	1.37939
ZPR6_7_F28_F25	2.1	-3.645	3.40029	-1.63824	0.758813
ZPR6_7_C28_F25	2.4	0.8347	3.78164	1.65884	1.06541
ZPR6_7_Pu240_Keff	0.2198	0.3607	1.93091	0.209717	0.103189
ZPPR9_Keff	0.1169	-0.02969	2.03919	-0.10195	0.0969107
ZPPR9_F28_F25	1.1	-11.16	3.50493	-1.27377	1.0251
ZPPR9_F49_F25	2	-3.956	3.34021	-2.06444	0.775036
ZPPR9_C28_F25	1.9	0.5084	3.66701	1.35848	1.05319
ZPPR9_NaV_S3	1.731	-3.166	6.87397	0.36969	1.06091
ZPPR9_NaV_S5	1.696	-5.643	9.36986	-0.476426	1.36974
Joyo_Keff	0.1798	-0.05842	1.14258	-0.0910051	0.167563

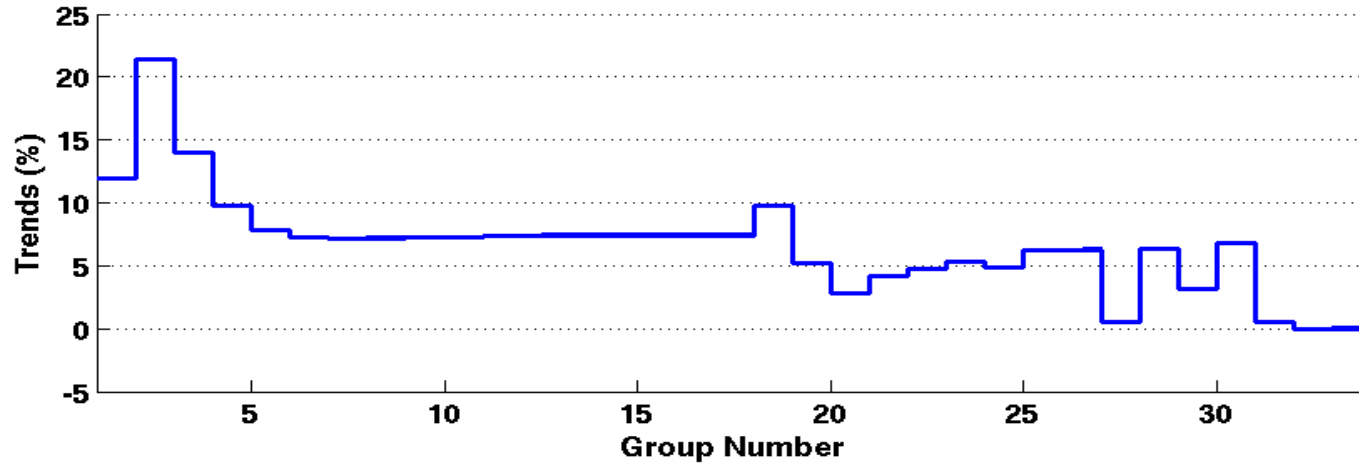
# CEA Activities in SG33 : Revised Results



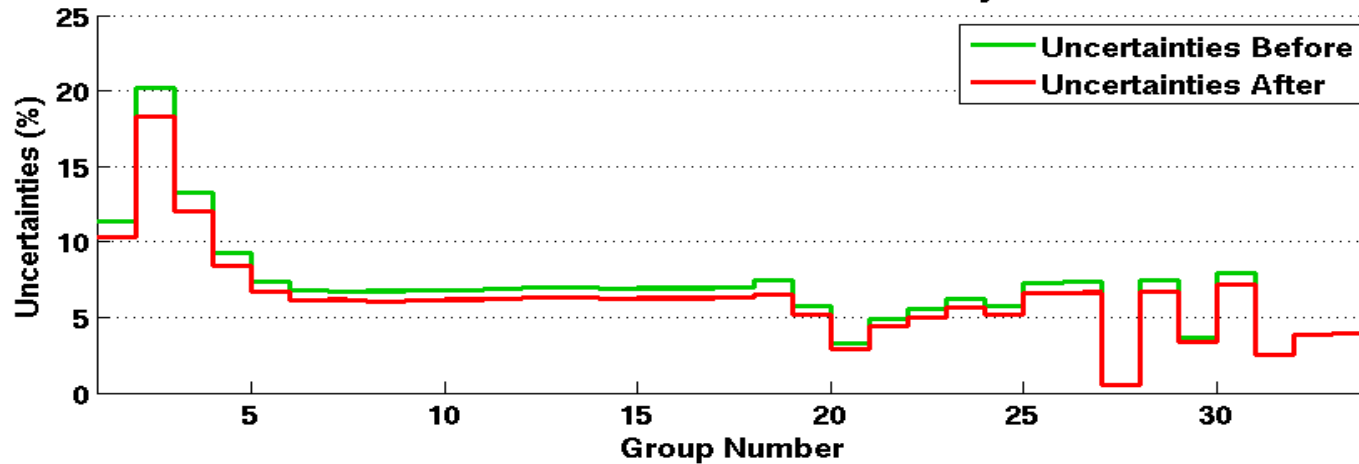
# CEA Activities in SG33 : Revised Results



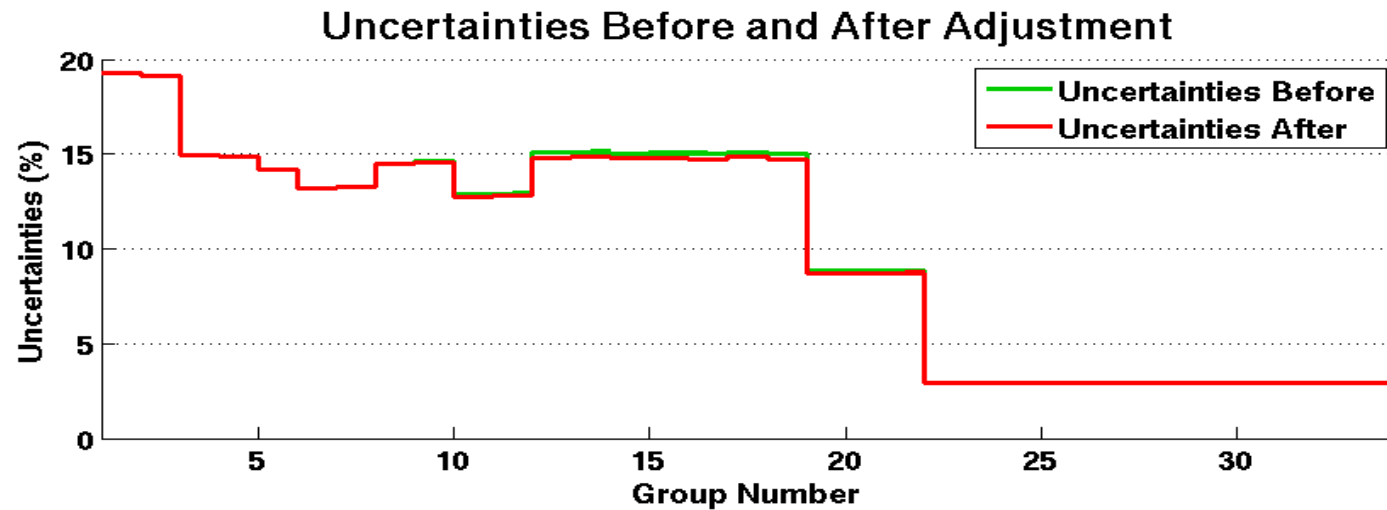
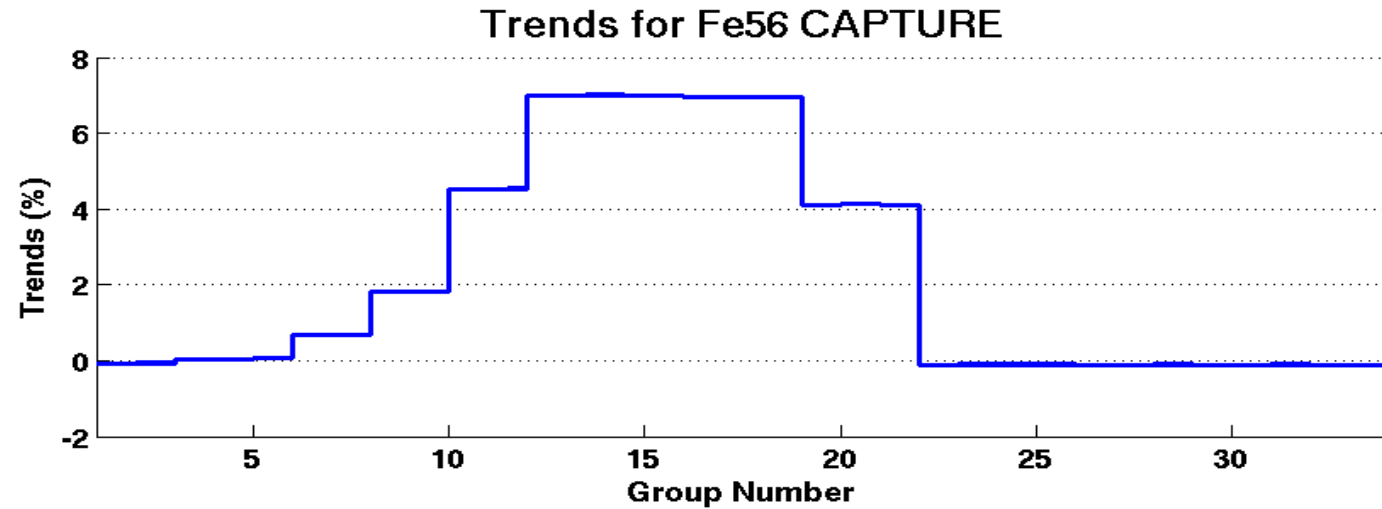
### Trends for Pu239 CAPTURE



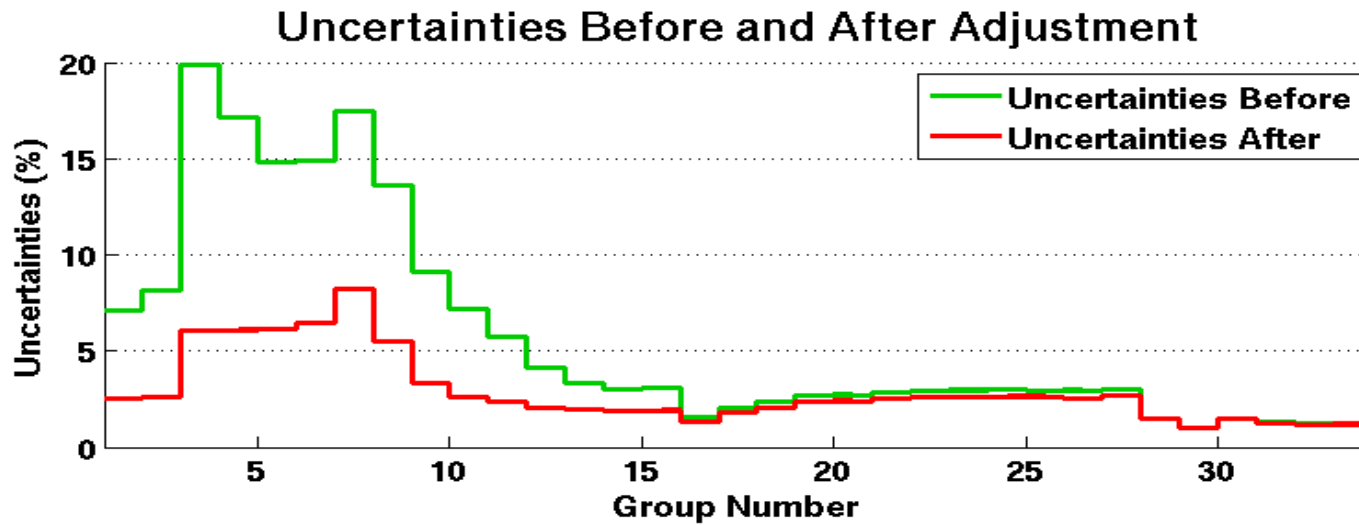
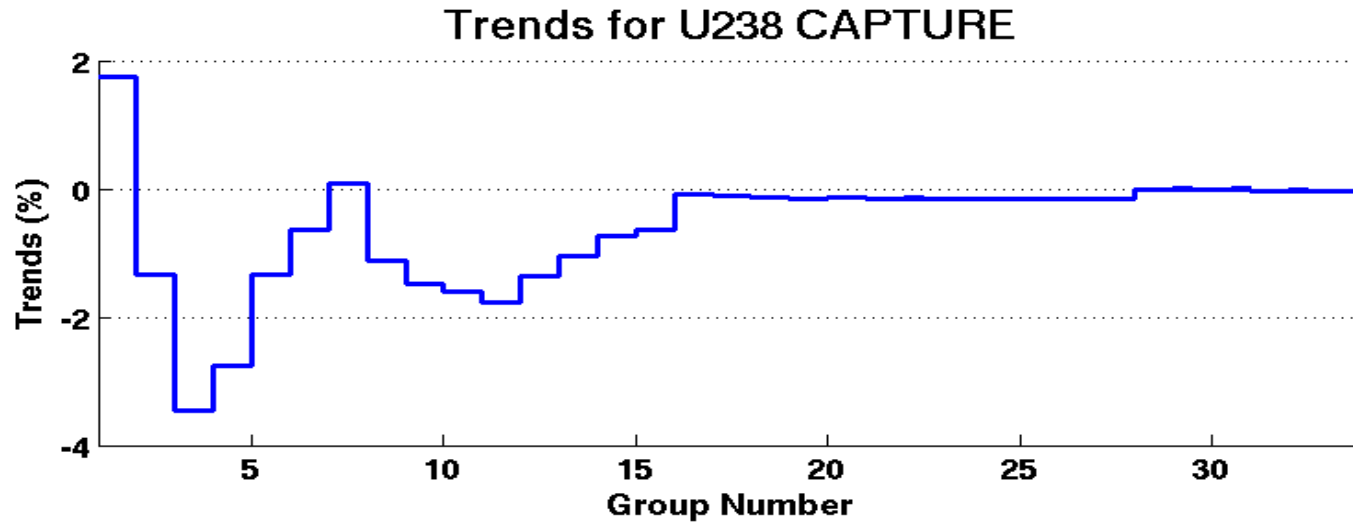
### Uncertainties Before and After Adjustment



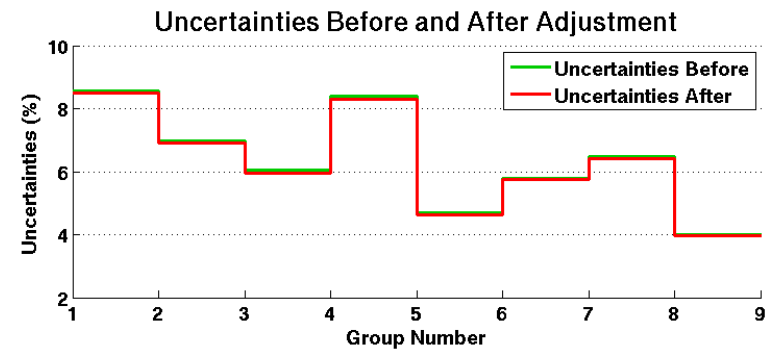
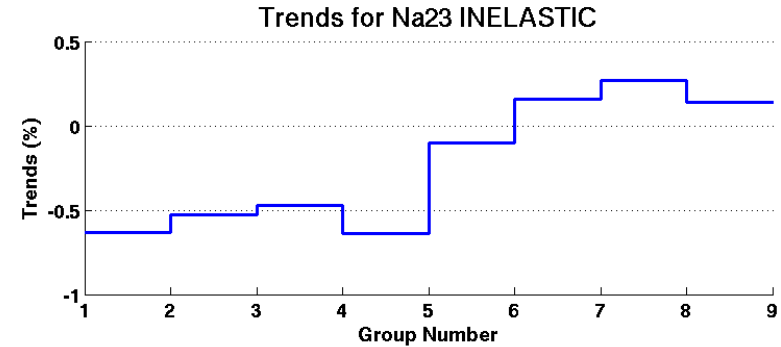
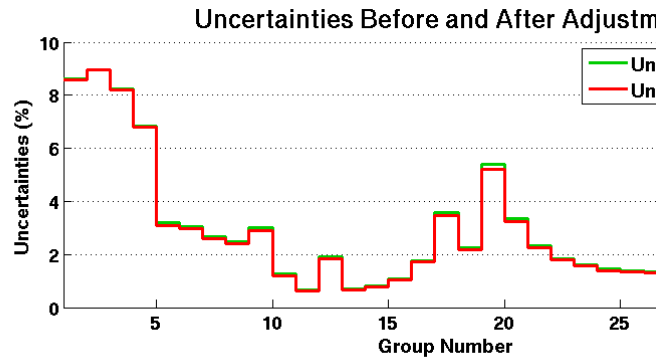
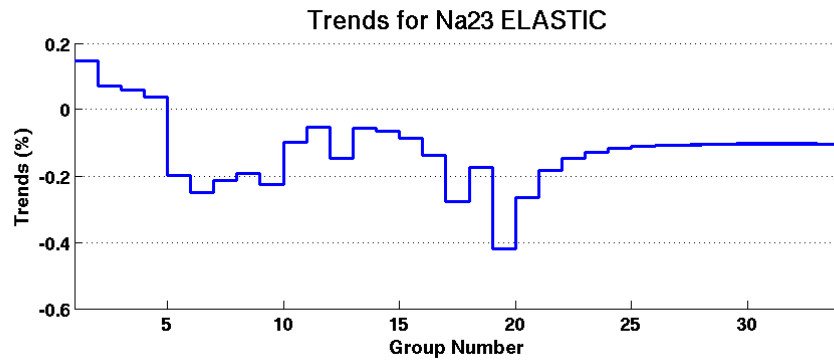
# CEA Activities in SG33 : Revised Results



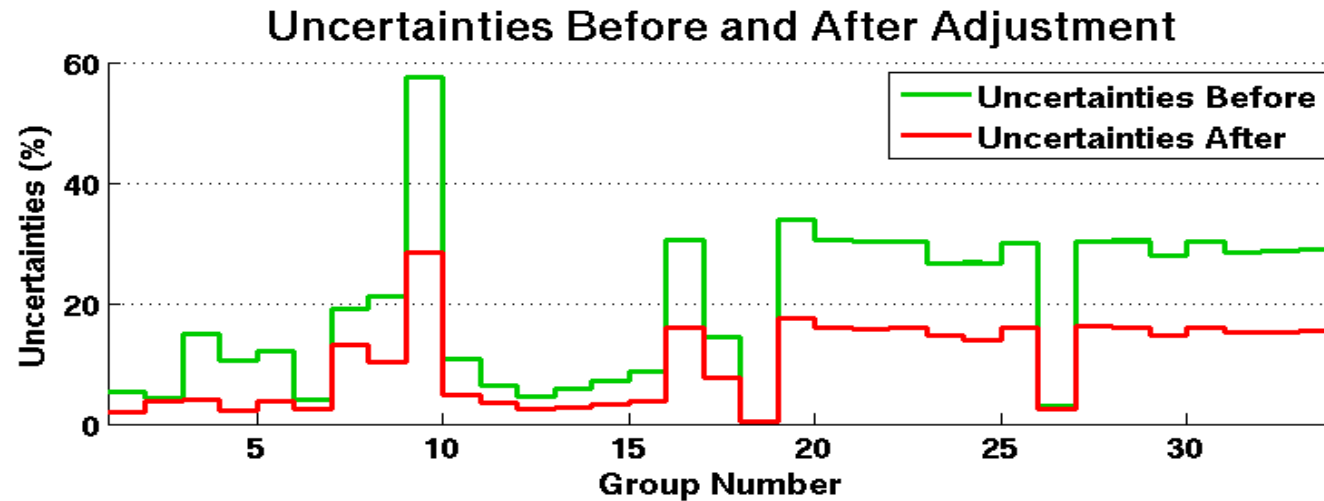
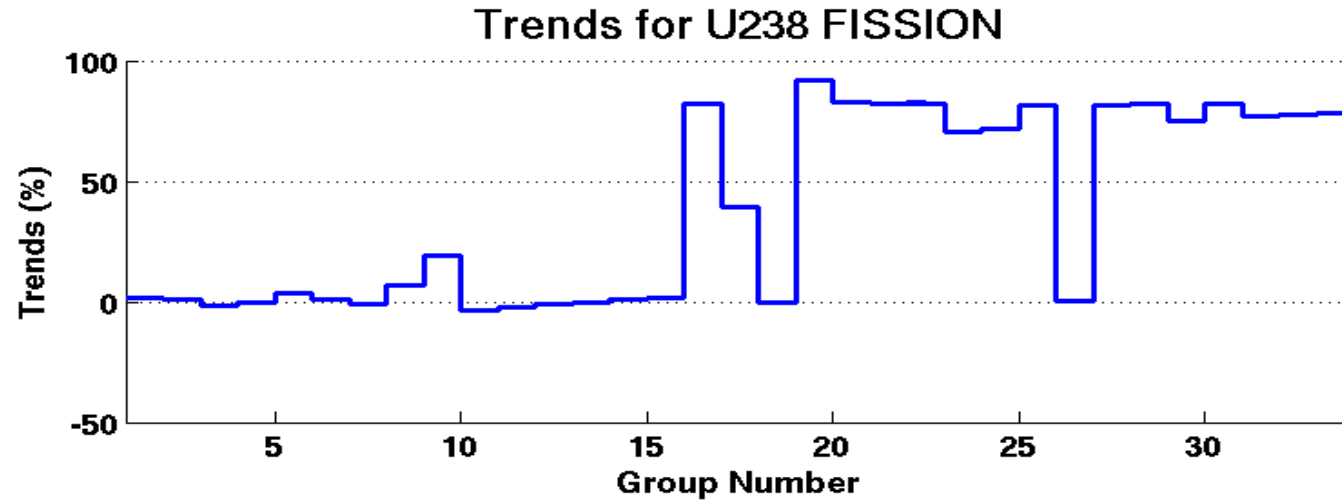
# CEA Activities in SG33 : Revised Results



# CEA Activities in SG33 : Revised Results



# CEA Activities in SG33 : Revised Results



# CEA Activities in SG33 : Preliminary Results

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## Preliminary Remarks : Uncertainty propagation



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- Reduction of Uncertainties of calculated Benchmarks → factor ~ 5-10
- All experimental information absorbed
- Final calculated values equivalent to experimental uncertainties
- Some Benchmarks goes in “wrong” directions but coherent with quoted uncertainties
- Better Adjustment with new Corrections Factors
- Strange Behaviour for Iron and  $^{239}\text{Pu}$  capture + Very strange behaviour for  $^{238}\text{U}$  Fission in low energy range ...
- No Uncertainty propagation to Reactor concept for now (coming soon)

# CEA Activities in SG33 : Preliminary Results

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## Preliminary Remarks : Cross Sections



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### Same Conclusions as 2010 End November Meeting

- ❑ **First Glance → no spurious correlations between Isotopes ...**
- ❑ **Changes on usual suspects : Pu239 and U238**
  - Pu239 fission cross section uncertainties divided by ~3-5
  - U238 capture cross section uncertainties divided by ~3-6
- ❑ **Further analysis are on the way....**
- ❑ **The whole picture is built → but additional work on part of the puzzle**

**ADD New Covariances + Chi and Nu uncertainties**