

Expansion of Heading ERR-i; (i-1,2,...) (A25)

(N. Otsuka, 2014-05-02, Memo CP-D/843)

Currently the (generic) partial uncertainty headings are expanded as

ERR-1: 1st **systematic** uncertainty

ERR-2: 2nd **systematic** uncertainty

etc., and I proposed to change them to

ERR-1: 1st **partial** uncertainty

ERR-2: 2nd **partial** uncertainty

etc. in the NRDC 2012 Meeting. Then I got the following action (Action 25 of NRDC 2013):

A25 Assess the correlation properties of uncertainties given under the heading ERR-1, ERR-2 etc. in the existing entries.

It is impossible to check all cases in EXFOR, and I selected 19 EXFOR data sets according to the following criterions:

- Reaction: neutron-induced reaction (SF2=N)
- Quantity: cross sections (CS)
- Source: data presented by the authors (TABLE)
- Year: publication in 1941, 1951, ..., 2001 or 2011 exists

Pub.	Entry	Description of ERR-1 by authors (in error budget table etc.)
1941		(no such an entry)
1951		(no such an entry)
1961	11329	“the absolute (standard deviation) error in the value of the cross section standard”
1971	10062	“sample mass” (introduced as one of “ systematic errors”
	10190	“Sum of correlated scale uncertainties” (in 2 nd reference published in 2011)
	20221	“calibrations of γ detector”
1981	30608	“standard cross section”
1991	14015	“fission counting efficiency”*
	14016	“efficiency” or “total fission mass uncertainty”*
	31406	“reference cross section”
	31479	“experimental error for the determination of the fast neutron flux by the associated alpha particle method” or “the experimental error for the geometry of the experiment”
2001	22662	“experimental error” (= including “statistical error”)
	22862	“detection efficiency”
	41455	“Fission and background events separation in pulse-height spectra” (introduced as “ partial systematic errors”)*
2011	23065	“Au-197 statistical error”
	23152	“pulse-height-weighting technique” (“ systematic uncertainties” in the caption of the budget table)

23155	“weighting function” (“ systematic error” in the caption of the budget table.)
23177	“Foil weight”
31668	“flight-path measurements” (introduced as a source of “ systematic uncertainties”)
31700	“detector efficiency”
31716	“in-house ^{236}U standard”

- Among these 19 entries, the word “systematic” is mentioned by the authors in only 5 articles.
- Some of them include even uncertainties due to counting statistics.
- LEXFOR “Errors” has explained that “systematic uncertainty” **may be** correlated. Namely the headings ERR-1, ERR-2,... in existing entries do not provide any information on correlation in general.

Proposals:

- Change “systematic” to “partial” in the expansion of ERR-1, ERR-2 etc.
- Use a correlation property flag (U, P, F, C) if we have information on correlation (e.g., “counting statistics”).
- Keep ERR-S and ERR-SYS for the uncertainty declared by the author as simply “(total) statistical uncertainty” and “(total) systematic uncertainty”. These headings are useful for some tables (e.g., C. Lederer et al., Table III of Phys.Rev.C83(2011)034608. See below.).

TABLE III. $^{197}\text{Au}(n,\gamma)$ cross sections and overall uncertainties.

E_{low} (keV)	E_{high} (keV)	σ (mb)	Uncertainty (%)		
			Statistic	Systematic	Total
5.010	5.621	1817	2.7	3.1	4.1
5.621	6.307	1970	2.4	3.1	3.9
6.307	7.076	1661	2.7	3.1	4.1
7.076	7.940	1569	2.6	3.1	4.1
7.940	8.908	1447	2.7	3.2	4.1
8.908	9.995	1092	3.8	3.2	5.0
9.995	11.215	1150	3.0	3.2	4.4
11.215	12.583	1125	3.3	3.2	4.6