CINDA2001

Correspondence
Old CINDA Quantity - new Reaction-Quantity

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The new quantity codes to be used for CINDA are contained in Dictionary 45 (see Appendix). They consist of codes extracted from DANIEL Dictionary 13 and additional codes not required for EXFOR, selected to meet CINDA needs.

The new quantity codes are more specific than the old ones about the type of data presented. They allow distinctions e.g. between total, partial or differential cross sections which were not possible with the old quantities. Specific examples are:
- NG was used to code total and partial (to isomer) capture cross sections (now distinguished by quantity CS resp. CSP);
- SNG and DNG were used for all γ-ray data: production cross sections, energy spectra, angular distributions, etc.;
- DIN was used for partial cross sections and all kinds of differential data;
- charged particle production cross section (NP,NA, etc.) were used for all types of data involved.

Therefore, in the conversion from old CINDA quantities to the new reaction+quantity formalism there are many cases were a new quantity could not be specified.

The table below lists the old CINDA quantities and the corresponding new codes for reaction and quantity. Where there is no one-to-one correspondence between old and new quantity, as mentioned above, the corresponding "new Q" field is blank in the table. Apart from the conversion, we propose the following important new features:

- **LDL** will be replaced by NQ (nuclear quantity) under which level density parameter, spin cutoff factor, nuclear temperature, etc. will be coded.

- There will be no correspondence for **CHG** for 2 reasons:
  (1) the distinction to code fission product and mass yields as NFY and charge yields as CHG was artificial;
  (2) also fractional yields (before coded as CHG in CINDA) are coded in EXFOR as ratios of fission yields with SF6=FY.

  Present solution (as proposed):
  - everything called fission yield, in EXFOR coded with FY in SF6, will be coded as NFY,
  - all other fission fragment quantities (including ZP and AP) will be coded as FRS.

  My personal thoughts concerning this matter (which I present for your consideration) are as follows: in addition to NFY (fission yields of mass, charge, products) and FRS (fragment kinetic energy, angular distribution, anisotropy etc.) there are parameters of theoretical concepts for distributions such as most probable mass or charge, widths of distributions, odd-even effects etc., which are neither NFY nor FRS (and also not the old CHG: there was no justification to code Ap as NFY and Zp as CHG as they are both theoretical concepts and not yields). Obviously, this third category has no correspondence in EXFOR quantities (although they can be derived from measurements). Therefore I propose to consider 3 quantities for fission product data:

- NFY for all data that are fission yields (PC/FIS) or ratios thereof (= fractional yields);
- FRS for differential with respect to angle, energy (distributions, anisotropy, etc.) fragment data
- PAR for parameters of mass or charge distribution models, either derived from measurements or to be used in entries for theoretical work.

- There will be only one quantity NU for prompt neutrons, which will include entries under the old codes **NU, NUF** and **SFN**.

- There will be no distinction in radiation spectra from fission corresponding to the old codes **SFG, FPG** and **FPB**. The new quantity code will be SPC and the distinction has to be clear from the reaction field (define outgoing particle) and the comments.

- **Strength function** will have no special code but will be coded as resonance parameter with appropriate comment.

- For the quantities defining ratios, **alpha** and **eta**, we allow a slash in the outgoing field that defines the ratio: e.g. alpha has reaction=N,G/F and quantity=ALF.

For the automatic conversion of old CINDA entries we propose the following solution to ensure that due to these changes there will be **no loss of information**:
- For blocks containing EXFOR index lines the coding derived from the EXFOR reaction should be adequate.
- A similar solution should be possible for evaluated data index lines.
- For the remaining entries, abbreviated information corresponding to the extinct codes could be added automatically to the comments, e.g. (CHG - CHG DIST), (NUF - FRAG NS), (SFG - PROMPT GS), (FPG - FP GS), etc., as given in the column “comment” in the table below.

Table: “Q” stands for quantity. The last 2 columns show the old expansion in the CINDA book and my proposals for new expansions, which I put forward for discussion.

old Q	**reaction**	**new Q**	**comment**	**expansion in book: old**	**new**
SEL	N,EL	CS		Elastic	total (n,n)
DEL	N,EL	DA		Diff Elastic	(n,n) angular distribution
POL	N,X	POL		Polarization	(n,X+n) polarization
POT	N,EL	POT		Potential Scat	(n,n) potential scattering
SIN	N,INL	CS		Total Inelastic	total (n,n′)
DIN	N,INL			Diff Inelastic	partial/differential (n,n′)
SCT	N,SCT			Scattering	n-scattering
N2N	N,2N			(n,2n)	(n,2n)
NXN	N,XN			(n,xn) x>2	(n,xn) x>2
NEM	N,X+N			n Emission	(n,X+xn) x=1,2,..: n-emission

old Q	reaction	new Q	comment	expansion in book: old	new
NG	N,G			(n,γ)	(n,γ)
RIG	N,G	RI		Res Int Capt	(n,γ) resonance integral
SNG	N,G			Spect (n,γ)	(n,γ) γ product/spectra
DNG	N,INL+G			Inelastic γ	(n,n′γ) γ product/spectra
NEG	N,X+G			Nonelastic γ	(n,X+γ) nonelastic γ
NP	N,P			(n,p)	(n,p)
NNP	N,N+P			(n,np)	(n,np)
PEM	N,X+P			p Emission	(n,X+p) p-emission
ND	N,D			(n,d)	(n,d)
NND	N,N+D			(n,nd)	(n,nd)
DEM	N,X+D			d Emission	(n,X+d) d-emission
NT	N,T			(n,t)	(n,t)
NNT	N,N+T			(n,nt)	(n,nt)
TEM	N,X+T			t Emission	(n,X+t) t-emission
NHE	N,HE3			(n,He3)	(n,X+He3)
NA	N,A			(n,α)	(n,α)
NNA	N,N+A			(n,nα)	(n,nα)
AEM	N,X+A			α Emission	(n,X+α) α-emission
NF	N,F	CS		Fission	(n,f)
RIF	N,F	RI		Res Int Fiss	(n,f) resonance integral
ALF	N,G/F	ALF		Alpha	alpha = (n,γ)/(n,f)
ETA	N,F/ABS	ETA		Eta	eta = $\bar{n}$ (n,f)/(n,abs)
NU	N,F or 0,F	NU	N-MULTIPL	Nu	(n,f) or (0,f) prompt n
NUD	N,F or 0,F	NUD		Delayed Neuts	(n,f) or (0,f) delayed n
NUF	N,F or 0,F	NU	FRAG-NS	Frag Neutrons	(n,f) or (0,f) prompt n
SFN	N,F or 0,F	NU	N-SPEC	Spect Fiss n	(n,f) or (0,f) prompt n
SFG	N,F or 0,F	SPC	PROMPT GS	Spect Fiss γ	(n,f) or (0,f) prompt γ
FPG	N,F or 0,F	SPC	FP GS	Fiss Prod γ	(n,f) or (0,f) prompt γ
FPB	N,F or 0,F	SPC	FP BETAS	Fiss Prod β	(n,f) or (0,f) prompt γ
NFY	N,F or 0,F	FY		Fission yield	(n,f) or (0,f) fission yield
FRS	N,F or 0,F	FRS		Frag Spectra	(n,f) or (0,f) fragment spectra
CHG	N,F or 0,F	FY	CHG DIST	Frag Charge	(n,f) or (0,f) fission yield
TOT	N,TOT	CS		Total	(n,tot)
SNE	N,NON	CS		Nonelastic	(n,nonelastic)
NX	N,X			Nucl Production	(n,X) nuclide production
ABS	N,ABS	CS		Absorption	(n,absorption)
RIA	N,ABS	RI		Res Int Abs	(n,abs) resonance integral
RES	N,0	RP		Reson Params	(n,0) resonance pars
STF	N,0	RP	STRGTH FN	Reson Params	(n,0) resonance pars
LDL	0,0	NQ		Level Density	nuclear quantity
GN	G,N			(γ,n)	(γ,n)
GF	G,F			Photofission	photofission
EVL	N,X	EVL		Evaluation	neutron data evaluation
TSL	N,SCT	TSL		Thermal Scat	neutron thermal scat

Appendix

Dictionary 45 (CINDA2001 quantity codes)

ALF	Alpha
AMP	Length or amplitude
COR	Angular correlation
CS	Cross section
CSP	Partial cross section
CST	Temperature dependent cross section
D3A	Triple differential dAngle1/dAngle2/dE'
D3E	Triple differential dAngle/dE1'/dE2'
D4A	Quadruple diff. dAng1/dAng2/dE1'/dE2'
DA	Differential d/dAngle
DAA	Double differential dAngle1/dAngle2
DAE	Double differential dAngle/dE'
DAP	Partial differential d/dAngle
DAT	Temperature-dependent Legendre coefficient
DE	Differential d/dE'
DEP	Energy spectrum for specific group
EC	Energy correlation
ETA	Eta
FRS	Fragment spectra
FY	Fission product yield
INT	Cross section integral over incident energy
KE	Kinetic energy
LMC	Partial linear momentum correlation
EMC	Effective mass correlation
NQ	Nuclear quantity
NU	Nu
NUD	Nu delayed
POL	Polarization
POD	Differential polarization
POT	Potential scattering
PY	Product yield (other than fission)
RI	Resonance integral
RP	Resonance parameter
RR	Reaction rate
SPC	Secondary energy spectrum
TSL	Thermal scattering
TT	Thick target yield
TTD	Differential thick target yield, d/dAngle
TTP	Partial thick target yield