

Low-level data structures in EXFOR and associated software. Development of EXFOR-XML.

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Topics:

1. Low level structures in EXFOR

- Structure of files, types of data (parameters, points and histograms)
- COMMON and DATA sections (tables)
- Connection to Reaction code and Pointers
- Covariance matrices (arrays)

2. Structures of data in plotting program ZVView/DINAMO

- $y(x)$ and $z(x,y)$: data types and storage and calculations
- Uncertainties, interpolation, calibration
- Calculations on input and output

3. Low-level data containers in EXFOR-XML

- Structure, elements, attributes
- Options to store floating-point data arrays
- Schema, interpretation, validation of non-XML data
- Limitations of format depending on programming languages
- Using 3-rd parties software tools (I/O, validation, Web-tools)

4. EXFOR-XML today

- Two output formats from Web retrieval system
- Online XSL transformation to interactive Html/Javascript
- XSD schema development, online validation

5. Concluding remarks

Data tables in EXFOR structure

EXFOR:

- Descriptive part (BIB Section) = *structured text*
- Common parameters (COMMON Section) = *data table 1xm*
- Data table (DATA Section) = *data table nxm*

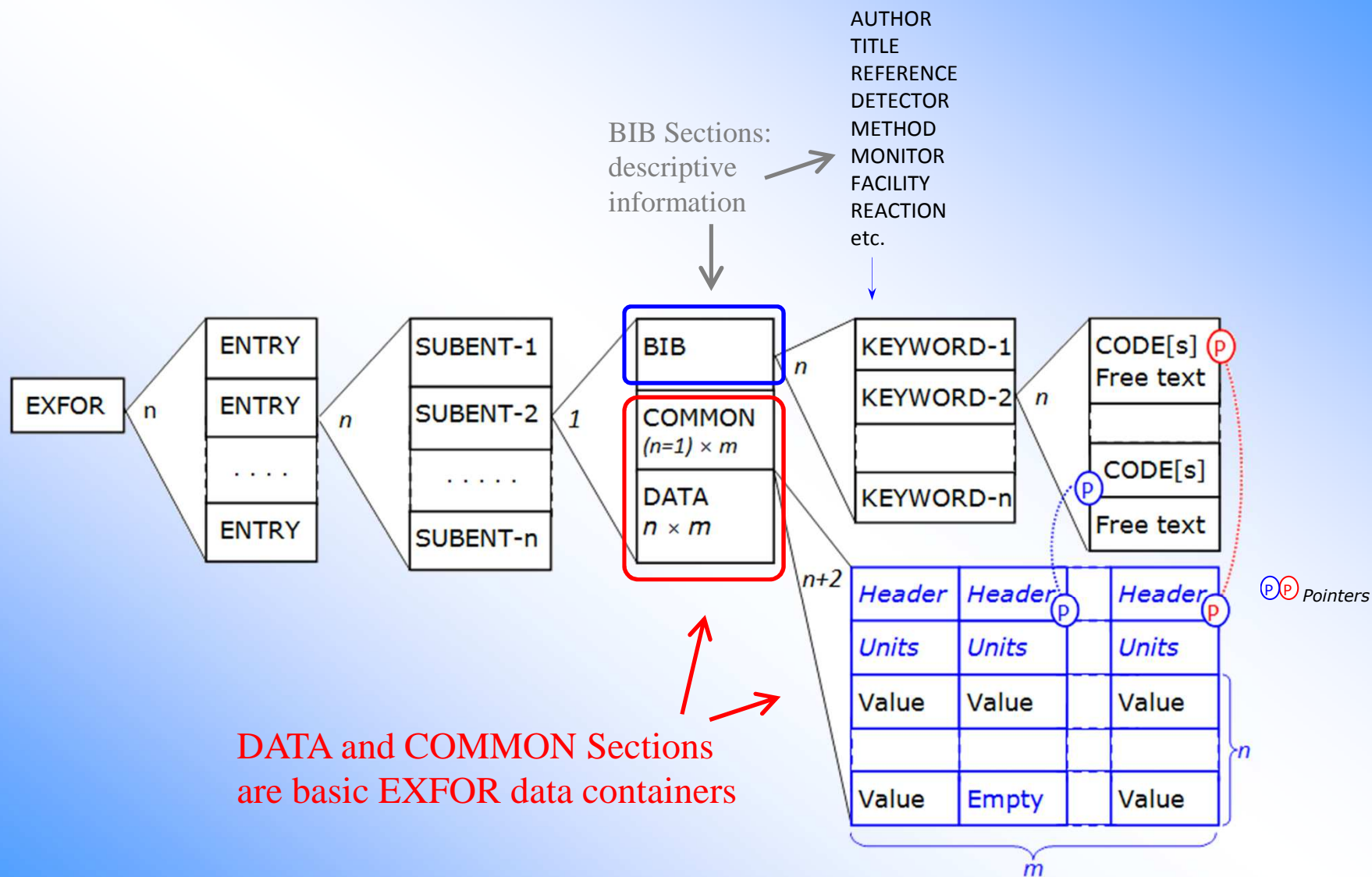
Data table: (this is basic EXFOR data container)

- Description of dimensions: $n \times m$
- Description of data columns: $2 \times m$
<Header, Units, Pointer> for every column
- Data values: $n \times m$
2-dimensional array of floating-point numbers, fixed width,
empty values are allowed
- End statement

Regulations of Data table content:

- Columns correspond to Reaction type
- Headers and Units are regulated by EXFOR Dictionaries
- Can contain data for several reactions having common columns
- Columns for different reactions are flagged by Pointers
- Can have special flags separating data obtained in different conditions

Data tables in EXFOR structure. Cont.



Data in EXFOR

Types of data:

1. Data given as independent data row in the table
 - Data for point: (x_1, x_2, x_3, \dots)
 - Data for intervals (histograms)
i.e. interpolation laws are: none, constant
2. Data given as block of data rows in the table
 - Legendre coefficients
3. Data given in Codes (e.g. Decay data):
 - Not yet widely used
4. Covariance data (few, development):
 - 3 arrays: $X[L]$, $Y[L]$, $Z[L*L]$
 - X and Y arrays can be numerical and non-structured text

DATA and COMMON
Sections

Features:

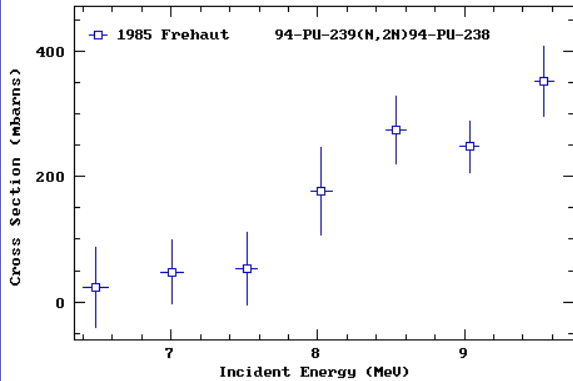
- Order, number and contents of columns are not fixed
- Meaning of numbers is wide:
value, approximate value, min., max., averaged values, etc.
- Data in COMMON section are common parameters for Entry or Subentry
(e.g. Angle)

Data in DATA Sections of EXFOR: examples

Individual points

```

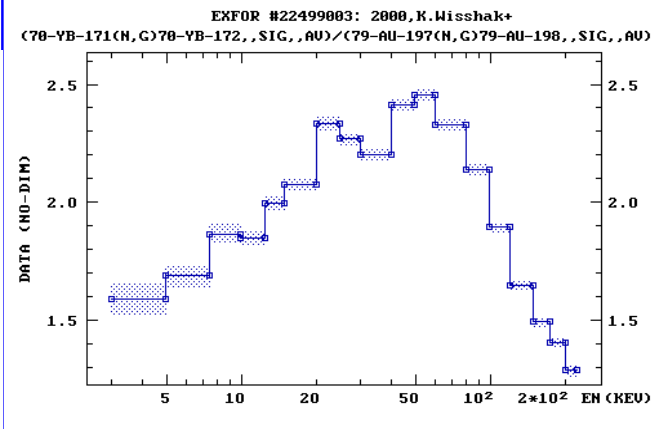
REACTION (94-PU-239(N,2N)94-PU-238,,SIG)
.....
DATA 4 14
EN EN-ERR DATA DATA-ERR
MEV MEV MB MB
6.49 0.085 24. 63.
7.01 0.08 49. 50.
7.52 0.075 54. 58.
8.03 0.075 177. 70.
8.54 0.07 275. 54.
9.04 0.065 249. 41.
9.55 0.065 354. 56.
10.06 0.06 415. 39.
10.56 0.06 411. 70.
11.07 0.055 356. 79.
11.57 0.055 418. 49.
12.08 0.055 455. 76.
12.58 0.05 318. 132.
13.09 0.05 588. 148.
ENDDATA 16
    
```



Data for intervals

```

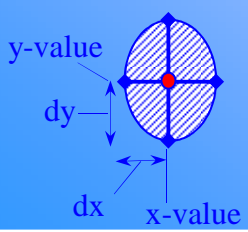
REACTION (70-YB-171(N,G)70-YB-172,,SIG,,AV)
Averaged over energy interval given
in DATA section.
.....
DATA 5 18
EN-MIN EN-MAX DATA ERR-T MONIT
KEV KEV MB PER-CENT MB
3. 5. 3611. 4.4 2266.7
5. 7.5 2919. 2.6 1726.7
7.5 10. 2271. 2.1 1215.7
10. 12.5 1974. 1.7 1066.7
12.5 15. 1756. 1.6 878.
15. 20. 1536. 1.2 738.8
20. 25. 1402. 1.1 600.
.....
150. 175. 394.5 1.2 263.7
175. 200. 355.5 1.3 252.6
200. 225. 320.4 1.7 248.5
ENDDATA 20
    
```



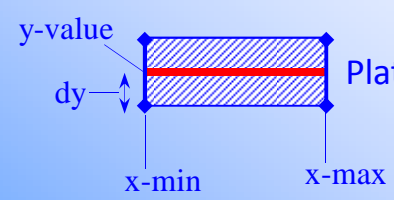
Legendre coefficients 704 datasets only

```

REACTION (1-H-2(D,EL)1-H-2,,DA,,LEG)
# Legendre coef.
# d/dA=a(0)+Sum(a(L)*p(L))
.....
DATA 5 56
EN EN-ERR NUMBER-CM DATA-CM DATA-ERR
MEV KEV NO-DIM B/SR B/SR
1.96 3.6 0. 0.541 0.006
1.96 3.6 2. 1.068 0.027
1.96 3.6 4. 0.96 0.039
1.96 3.6 6. 0.664 0.039
1.96 3.6 8. 0.334 0.03
1.96 3.6 10. 0.099 0.015
2.51 4. 0. 0.445 0.004
2.51 4. 2. 0.768 0.02
2.51 4. 4. 0.612 0.029
2.51 4. 6. 0.401 0.029
2.51 4. 8. 0.187 0.023
2.51 4. 10. 0.05 0.012
3.02 4.5 0. 0.397 0.005
3.02 4.5 2. 0.638 0.024
3.02 4.5 4. 0.487 0.034
3.02 4.5 6. 0.313 0.035
3.02 4.5 8. 0.157 0.027
3.02 4.5 10. 0.043 0.015
5.5 8.1 0. 0.267 0.001
5.5 8.1 2. 0.311 0.005
5.5 8.1 4. 0.149 0.007
5.5 8.1 6. 0.079 0.007
5.5 8.1 8. 0.03 0.004
6.2 9.5 0. 0.248 0.001
6.2 9.5 2. 0.278 0.004
6.2 9.5 4. 0.118 0.006
6.2 9.5 6. 0.056 0.006
6.2 9.5 8. 0.019 0.004
ENDDATA 58
    
```



Point: one line



Plato: one line



Point: filtered block of lines - list of parameters (array) for calculation

Coding covariance data in EXFOR files

Covariance information is placed in free text starting from column 13 under the keyword COVARINCE using the following conventions. The text describe and store one-dimensional arrays X_i , Y_j and two-dimensional arrays with covariance or correlation matrices $Z_{i,j}(X_i, Y_j)$. For every array X, Y, Z the following information should be given in two parts:

1. Code (Descriptor): a text enclosed in parentheses and having four parameters separated by commas: (1) type and (2) length of array, (3) units and (4) data type
2. Data array: lines following the Code with real numbers separated by blanks or text lines with leading index

Energy-Energy correlation data

	Array	Length	Units	Meaning
Code	→	(XY, 4,	MEV,	EN)
Data	→	0.597	0.797	0.898 0.906
Code	→	(Z, 10,	PER-CENT,	COR)
Data	→	100		
		46	100	
		40	32	100
		56	43	37 100

Reaction-Reaction correlations

	Flag: text array
Code	→ (XY, 4, N, Reaction)
Comment	→ N Reaction
Data:	→ 1 Al-27(n,a)Na-24
text array	→ 2 Mg-24(n,p)Na-24
	→ 3 Ti-46(n,p)Sc-46
	→ 4 Ti-47(n,p)Sc-47
	(Z, 10, NO-DIM, COR)
	...

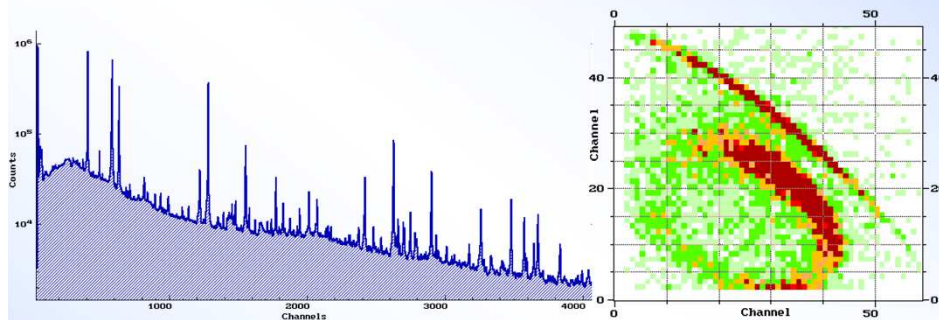
Correlations of the Legendre coefficients

```
(XY, 6, NO-DIM, NUMBER)
0 1 2 3 4 5
(Z, 21, PER-CENT, COR:EN=13.33 MEV)
100
7 100
-1 51 100
. . . . .
```

Fractional correlation matrices

```
. . . . .
(ZP, 45, PER-CENT, COR:MONIT-ERR)
. . . . .
(ZP, 45, PER-CENT, COR:ERR-4)
. . . . .
(Z, 45, PER-CENT, COR:ERR-T)
. . . . .
```

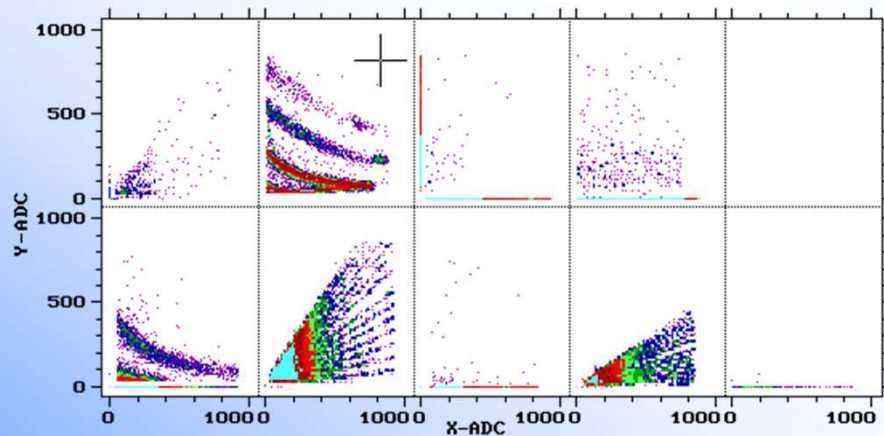

2. Structures of data in plotting system ZVView-DINAMO



DINAMO: universal library of C subroutines for interactive plotting in nuclear research (1993-1999).

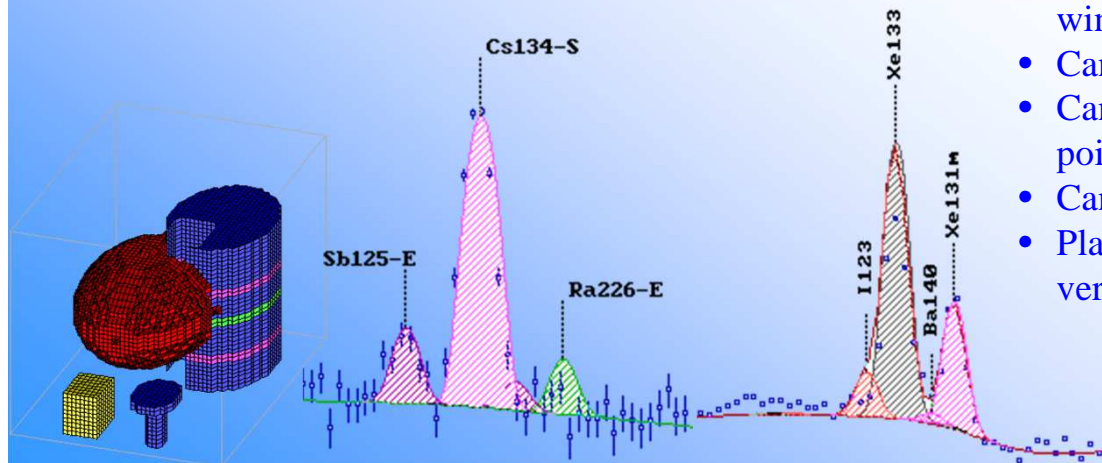
Graphics tools for nuclear research:

- Experiments (online, 1D, 2D histograms)
- Treatment experimental results
- Plotting analytical functions



Features:

- Works with functions: y , $y(x)$, $z(x,y)$
- Plots many functions
- Data can be given in arrays (I2, I4, R4, R8) and can be calculated on the fly - calibration $getx(i)$, external functions (gamma-lines, Gaussians with background)
- Uncertainties can be given in arrays or calculated: per-cent, $\sqrt{\text{counts}}$, constant, etc.
- Display regimes: lin/log of x/y, interpolations (histograms/lin-lin), error bars/cloud/pipe, one-many windows, MOV/XOR, etc.
- Can plot maps, contours, 3D and animated 3D of $z(x,y)$
- Can be used for identify lines for different isotopes, data points of different authors and publications
- Can produce pcx, gif, ps/eps, emf, animated-gif
- Platforms: MS-Windows, Linux, Mac-OSX; old versions: MSDOS, VMS, DEC-UNIX, RS6000



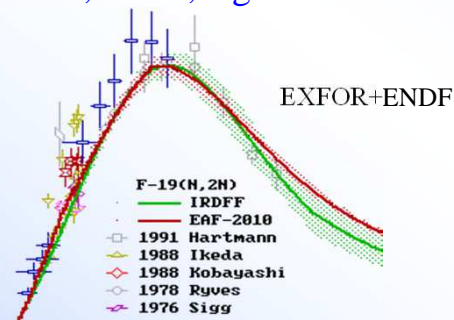
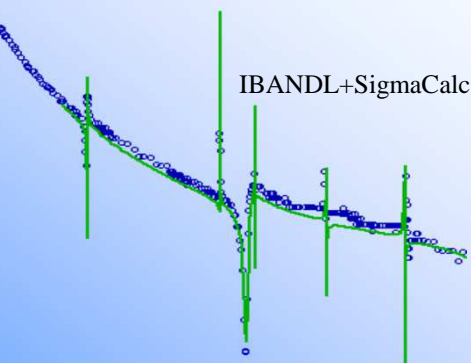
Structures of data in plotting program ZVView

ZVView: interactive plotting program for display and analysis of nuclear data.

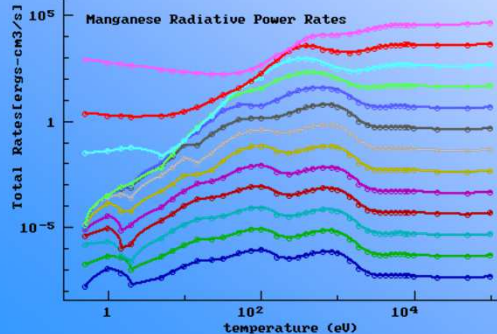
Kiev-Vienna, 1996-2013

Features:

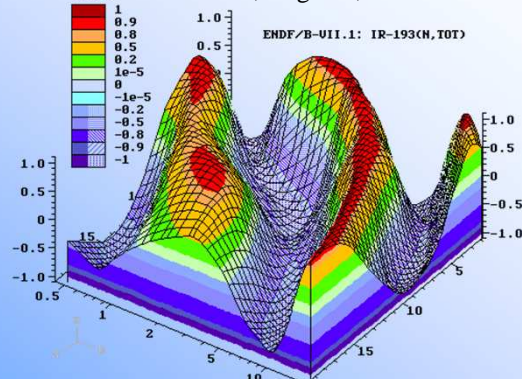
- All features inherited from DINAMO;
- Integrated with Empire, EndVer, EXFOR CD-ROMs.
- Works on Web: integrated with EXFOR-ENDF database retrieval systems, IBANDL, SigmaCals, LiveChart: can read data from remote archives, can be called as part of external Web service, etc.
- Reads nuclear data formats: TABLE/XREF, ENDF-MF3/MF40/MF33(Law5);
- Can read data from text files (columns): {y}; {x y}; {x y dy}; {x y dy dx}; {x y +dy -dy +dx -dx}; {x} {y} z{};
- Understands ENDF interpolation laws, can display ratios to selected curve
- Can do some least squared fitting, displays χ^2 (EXFOR-ENDF)
- Can work with authors: filter data, select, legend etc.



FLYCHK (A+M): Web-Web communication



ENDF/MF33: Web, interactive, Log-Lin, animated



Function are presented in C structures

having pointers to

- a) data arrays,
- b) descriptions of calculation (algorithm + parameters),
- c) pointer to external subroutine.

Arrays – members of structure describing how to get data: x[], y[], +dx[], -dx[], +dy[], -dy[], z[], authors[]

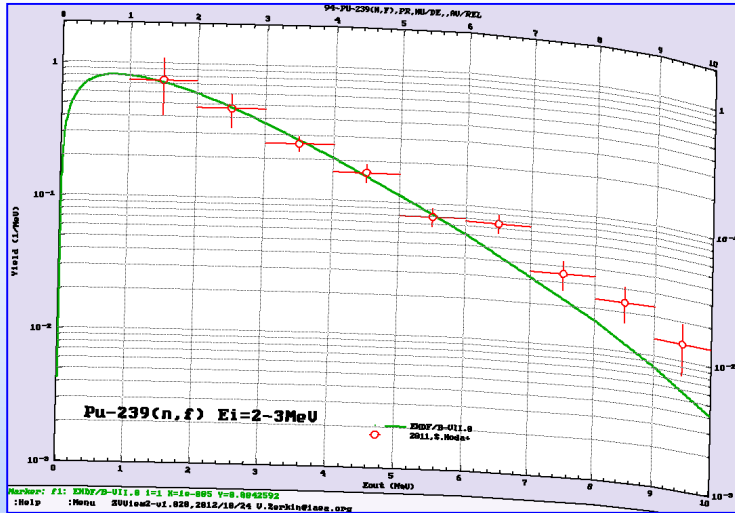
Programs get data via subroutines, e.g.:

```
xi=getX(*fx,i);          yi=getY(*fy,i,xi);
dxi=getErr(*fx,i,xi);   dyi=getErr(*fy,i,yi);
```

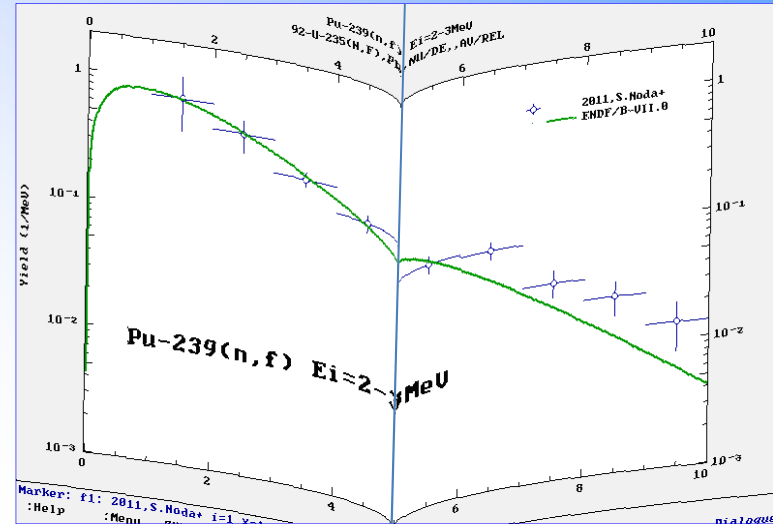
Calculations, calculations, calculations:
data -> interpolation -> axes type -> screen

Recently added functions wrapping ZVView output

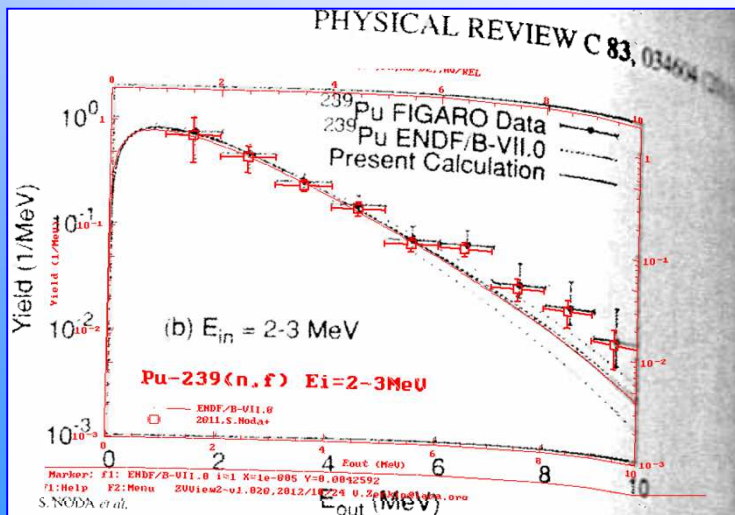
ZVView output distorted using 2-D scales calibration procedures



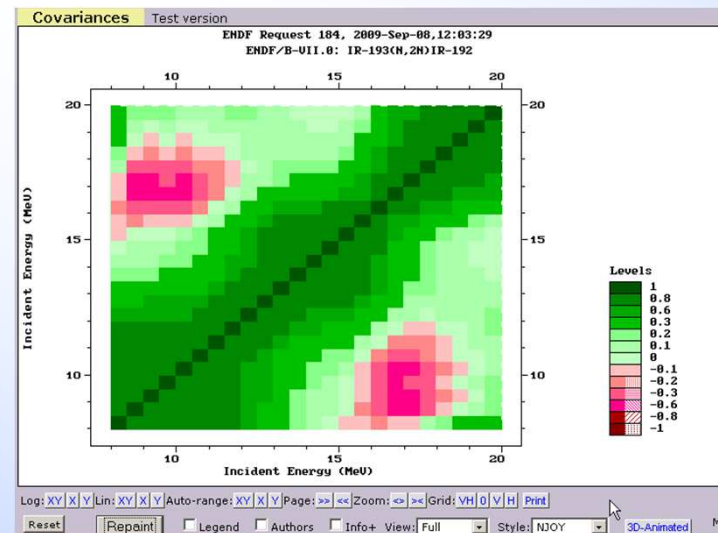
Transformed plot imitating photocopy of scanned book pages



Comparison distorted plot with scanned original



Interactive rotation of 3-D animated correlation matrix



3. Low level containers in EXFOR.XML

Main task:

- To present EXFOR Data tables using XML

Data table:

- Description of data columns: $2 \times m$
<Header, Units, Pointer> for every column
- Data table 2-dimensional array $n \times m$ of floating-point numbers with empty values allowed

Taking into account:

- Since we construct EXFOR XML for compilers we have to foresee ways to minimize mistakes in data input, additional control, eye checking
- Do we want to allow optional elements and attributes (comments, flags)
- Do we need to improve present EXFOR data structure (e.g. blocking of lines – can we find better solution?)

Example of original EXFOR file

```

SUBENT      12528018  19991005  20060315  20060313      133812528018  1
BIB          2          5                12528018      2
REACTION    1(94-PU-241(N,0),,EN)          12528018      3
            2(94-PU-241(N,TOT),,WID)        12528018      4
            3(94-PU-241(N,TOT),,SIG,,RES)    12528018      5
            4(94-PU-241(N,EL),,WID,,2G)     12528018      6
ANALYSIS    (SLA) Single-level Breit-Wigner analysis. 12528018      7
ENDBIB      5                12528018      8
NOCOMMON    0          0                12528018      9
DATA        8          12              12528018     10
DATA        1DATA-ERR 1DATA          2DATA-ERR 2DATA      3DATA-ERR 312528018 11
DATA        4DATA-ERR 4                12528018     12
EV          EV          EV          EV          B          B          12528018     13
MILLI-EV    MILLI-EV                12528018     14
 14.74      0.05      0.15      0.05      3660.      120.      12528018     15
  6.2       1.        12528018     16
 15.96      0.08      0.60      0.15      245.       25.       12528018     17
  1.8       12528018     18
 16.70      0.08      0.25      0.1       360.       20.       12528018     19
  1.2       12528018     20
 17.85      0.05      0.05      0.09      4670.      250.      12528018     21
  3.2       0.8
 20.75      0.17      0.09      0.1
  0.32
 21.99      0.24      0.20      0.1
  0.13
 23.04      0.3       0.60      0.25
  1.5
 24.12      0.16      0.22      0.14
  1.4       0.9
 26.45      0.17      0.34      0.10
  4.3       1.3
 28.97      0.22      0.72      0.1
  5.0
 29.57      0.25      0.05      0.05
  0.36
 31.03      0.21      0.36      0.10
  2.4       0.6
ENDDATA      28
ENDSUBENT    38

```

Interpretation of EXFOR file (no 80-columns limit)

```

SUBENT      12528018  19991005  20060315  20060313      1338
BIB          2          5
REACTION    1(94-PU-241(N,0),,EN)
            2(94-PU-241(N,TOT),,WID)
            3(94-PU-241(N,TOT),,SIG,,RES)
            4(94-PU-241(N,EL),,WID,,2G)
ANALYSIS    (SLA) Single-level Breit-Wigner analysis.
ENDBIB      5
NOCOMMON    0          0
DATA        8          12
DATA        1DATA-ERR 1DATA          2DATA-ERR 2DATA      3DATA-ERR 3DATA      4DATA-ERR 4
EV          EV          EV          EV          B          B          MILLI-EV  MILLI-EV
14.74      0.05      0.15      0.05      3660.      120.      6.2       1.
15.96      0.08      0.60      0.15      245.       25.       1.8
16.7       0.08      0.25      0.1       360.       20.       1.2
17.85      0.05      0.05      0.09      4670.      250.      3.2       0.8
20.75      0.17      0.09      0.1       222.       50.       0.32
21.99      0.24      0.20      0.1       37.        15.       0.13
23.04      0.3       0.60      0.25      142.       20.       1.5
24.12      0.16      0.22      0.14      346.       25.       1.4       0.9
26.45      0.17      0.34      0.1       625.       35.       4.3       1.3
28.97      0.22      0.72      0.1       310.       25.       5.
29.57      0.25      0.05      0.05      320.       100.      0.36
31.03      0.21      0.36      0.1       278.       25.       2.4       0.6
ENDDATA      28

```

Output from Web EXFOR database retrieval system

DATA

DATA Columns

DATA	1	Value of quantity specified under REACTION	EV	electron-Volts	
DATA-ERR	1	Error in value of quantity, defined under ERR-ANALYS	EV	electron-Volts	
DATA	2	Value of quantity specified under REACTION	EV	electron-Volts	
DATA-ERR	2	Error in value of quantity, defined under ERR-ANALYS	EV	electron-Volts	
DATA	3	Value of quantity specified under REACTION	B	barns	
DATA-ERR	3	Error in value of quantity, defined under ERR-ANALYS	B	barns	
DATA	4	Value of quantity specified under REACTION	MILLI-EV	milli-Electron-Volts	EV *0.001
DATA-ERR	4	Error in value of quantity, defined under ERR-ANALYS	MILLI-EV	milli-Electron-Volts	EV *0.001

DATA Table

DATA 1	DATA-ERR 1	DATA 2	DATA-ERR 2	DATA 3	DATA-ERR 3	DATA 4	DATA-ERR 4
EV	EV	EV	EV	B	B	MILLI-EV	MILLI-EV
14.74	0.05	0.15	0.05	3660.	120.	6.2	1.
15.96	0.08	0.6	0.15	245.	25.	1.8	
16.7	0.08	0.25	0.1	360.	20.	1.2	
17.85	0.05	0.05	0.09	4670.	250.	3.2	0.8
20.75	0.17	0.09	0.1	222.	50.	0.32	
21.99	0.24	0.2	0.1	37.	15.	0.13	
23.04	0.3	0.6	0.25	142.	20.	1.5	
24.12	0.16	0.22	0.14	346.	25.	1.4	0.9
26.45	0.17	0.34	0.1	625.	35.	4.3	1.3
28.97	0.22	0.72	0.1	310.	25.	5.	
29.57	0.25	0.05	0.05	320.	100.	0.36	
31.03	0.21	0.36	0.1	278.	25.	2.4	0.6

EXFOR-XML-test, V.Zerkin, IAEA-NDS, 2009-03-31.

Web Server: X4.java :

EXFOR file → **x4.xml + x4.xsl**

Interactive
Html/Javascript

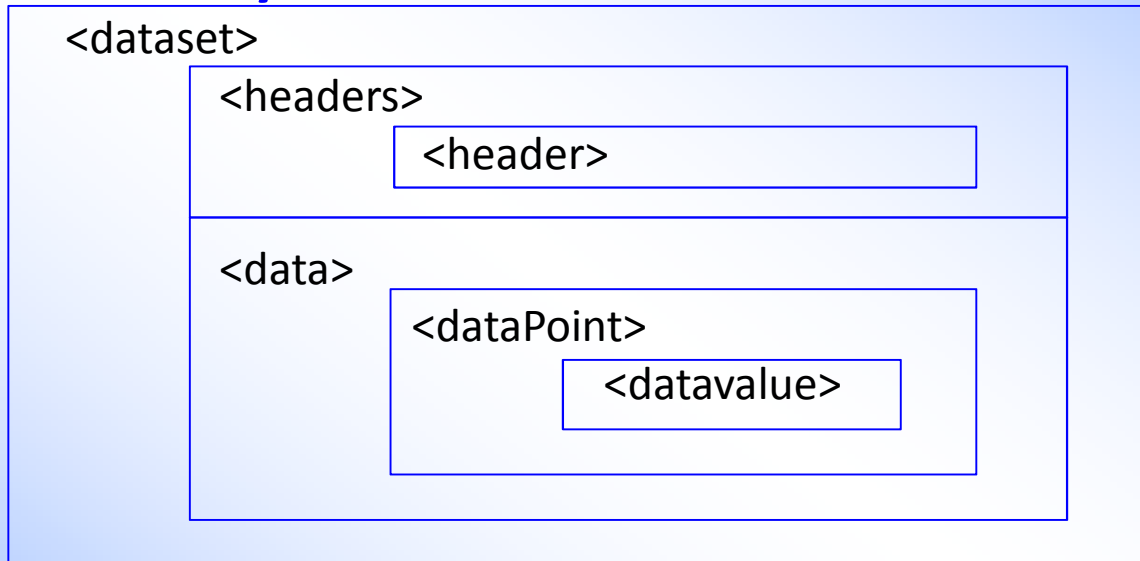
Web Browser → **html** → User

Output from Web: EXFOR.XML

```
http://zlinux2.iaea.org:8080/exfor2/servlet/X4sShowXML?db=x4&op=get_x4plus2&req=432&i=8&File=X4R432_x4.txt&xsl=11&Title=EXFOR%20Requ...
File Edit Format
116 <dataset type="DATA" col="8" ln="12" acc="12528018">
117   <headers>
118     <header n="1" code="DATA" pointer="1" hlp="Value of quantity specified under REACTION"
119       units="EV" unitsHlp="electron-Volts" />
120     <header n="2" code="DATA-ERR" pointer="1" hlp="Error in value of quantity, defined under ERR-ANALYS"
121       units="EV" unitsHlp="electron-Volts" />
122     <header n="3" code="DATA" pointer="2" hlp="Value of quantity specified under REACTION"
123       units="EV" unitsHlp="electron-Volts" />
124     <header n="4" code="DATA-ERR" pointer="2" hlp="Error in value of quantity, defined under ERR-ANALYS"
125       units="EV" unitsHlp="electron-Volts" />
126     <header n="5" code="DATA" pointer="3" hlp="Value of quantity specified under REACTION"
127       units="B" unitsHlp="barns" />
128     <header n="6" code="DATA-ERR" pointer="3" hlp="Error in value of quantity, defined under ERR-ANALYS"
129       units="B" unitsHlp="barns" />
130     <header n="7" code="DATA" pointer="4" hlp="Value of quantity specified under REACTION"
131       units="MILLI-EV" unitsHlp="milli-Electron-Volts" BasicUnits="EV" unitsConversionFactor="0.001" />
132     <header n="8" code="DATA-ERR" pointer="4" hlp="Error in value of quantity, defined under ERR-ANALYS"
133       units="MILLI-EV" unitsHlp="milli-Electron-Volts" BasicUnits="EV" unitsConversionFactor="0.001" />
134   </headers>
135   <data nn="12">
136     <dd n="1"><d>14.74 </d><d>0.05 </d><d>0.15 </d><d>0.05 </d><d>3660. </d><d>120. </d><d>6.2 </d><d>1. </d></dd>
137     <dd n="2"><d>15.96 </d><d>0.08 </d><d>0.6 </d><d>0.15 </d><d>245. </d><d>25. </d><d>1.8 </d><d></d></dd>
138     <dd n="3"><d>16.7 </d><d>0.08 </d><d>0.25 </d><d>0.1 </d><d>360. </d><d>20. </d><d>1.2 </d><d></d></dd>
139     <dd n="4"><d>17.85 </d><d>0.05 </d><d>0.05 </d><d>0.09 </d><d>4670. </d><d>250. </d><d>3.2 </d><d>0.8 </d></dd>
140     <dd n="5"><d>20.75 </d><d>0.17 </d><d>0.09 </d><d>0.1 </d><d>222. </d><d>50. </d><d>0.32 </d><d></d></dd>
141     <dd n="6"><d>21.99 </d><d>0.24 </d><d>0.2 </d><d>0.1 </d><d>37. </d><d>15. </d><d>0.13 </d><d></d></dd>
142     <dd n="7"><d>23.04 </d><d>0.3 </d><d>0.6 </d><d>0.25 </d><d>142. </d><d>20. </d><d>1.5 </d><d></d></dd>
143     <dd n="8"><d>24.12 </d><d>0.16 </d><d>0.22 </d><d>0.14 </d><d>346. </d><d>25. </d><d>1.4 </d><d>0.9 </d></dd>
144     <dd n="9"><d>26.45 </d><d>0.17 </d><d>0.34 </d><d>0.1 </d><d>625. </d><d>35. </d><d>4.3 </d><d>1.3 </d></dd>
145     <dd n="10"><d>28.97 </d><d>0.22 </d><d>0.72 </d><d>0.1 </d><d>310. </d><d>25. </d><d>5. </d><d></d></dd>
146     <dd n="11"><d>29.57 </d><d>0.25 </d><d>0.05 </d><d>0.05 </d><d>320. </d><d>100. </d><d>0.36 </d><d></d></dd>
147     <dd n="12"><d>31.03 </d><d>0.21 </d><d>0.36 </d><d>0.1 </d><d>278. </d><d>25. </d><d>2.4 </d><d>0.6 </d></dd>
148   </data>
149 </dataset>
```

Structure of low level container in EXFOR.XML (ver-0:2009, ver-1:2011)

Hierarchy:



Element <header> include as attributes: Header and Units (codes from dictionary), help-text, conversion coefficient, etc.

Every data value is presented by separated element.

```
<data nn="12">
  <dd n="1" ><d>14.74</d> . . . <d>1.</d></dd>
  . . .
  <dd n="10"><d>28.97</d> . . . <d></d></dd> . . . .
</data>
```

Value Empty

How to store 2dim. array of floating point numbers

Option-1: Every data value is presented by separated element ($n*m$ XML elements)

```
<data nn="4" mm=3">
  <dd><d>14.74</d><d>0.05</d><d>0.15</d><d>0.05</d></dd>
  <dd><d>310  </d><d>25  </d><d>5    </d><d>    </d></dd>
  <dd><d>278  </d><d>21  </d><d>2.4  </d><d>0.6  </d></dd>
</data>
```

Option-2: Every data point is presented List of float numbers (n XML elements)

```
<data nn="4" mm="3">
  <dd>14.74 0.05 0.15 0.05</dd>
  <dd>310   25   5   NaN </dd>
  <dd>278   21   2.4 0.6 </dd>
</data>
```

← Empty, i.e. value is not given:
NaN == Not a Number

Option-3: All data values are presented List of float numbers (1 XML element)

```
<data nn="4" mm="3">
  14.74 0.05 0.15 0.05
  310   25   5   NaN
  278   21   2.4 0.6
</data>
```

==

```
<data nn="4" mm="3">
  14.74 0.05 0.15 0.05 310 25 5 NaN 278 21 2.4 0.6
</data>
```

Option-2 was implemented (2013).
I think Option-2 is preferable for EXFOR.

XSL and XSD: transformation and validation

Technical knowledge?

- How to present non-XML list in Html table (i.e. split list to <td>'s)?
- How to validate and present absent and wrong values?
- How to allow optional elements and attributes in the data point (e.g. comments)?
- How to validate XML generated in EXFOR retrieval system using online (Web) validators?
- How to validate XML together with schema using online validators?
- Etc., etc.

4. Status of EXFOR XML, XSL, XSD as of May 2013

http://zlinux2.iaea.org:8080/exfor2/x4guide/my-XML/xml3/ - Windows Internet Explorer provided by IAEA

XML files and associated tools

V.Zerkin, May 2013

This page presents my development of XML for EXFOR:

- **XML** files generated from [Web EXFOR system](#);
- **XSL** file describing transformation of EXFOR.XML to interactive HTML using XPath and XSL-FO;
- **XSD** schema describing correct EXFOR.XML files;
- interpretation EXFOR.XML files to interactive HTML/JavaScript via XSL transformation by a Web browser;
- translation EXFOR.XML files by XSL file to interactive HTML by a program 'xsltproc';
- examples of EXFOR.XML files with various mistakes to test validation tools;
- validation XML files using online tool '<http://validator.w3.org>';
- validation XML files with XSD schema using program 'xmllint'.

#	Description	XML	XML+XSL by browser	HTML by 'xsltproc'	validate on w3.org	Message from 'xmllint'
1.	Correct XML file	txt xml	xml+xsl	html	+ a0ok.xml	+ a0ok.xml validates
2.	Correct XML file with optional elements and attributes in <data>	txt xml	xml+xsl	html	+ a1ok.xml	+ a1ok.xml validates
3.	Mistake in element: using </headersX> instead of </headers>	txt xml	xml+xsl	err-msg	x a1err1.xml	x a1err1.xml:137: parser error : expected '>' </headersX> ^
4.	Mistake: using additional attribute in the element with strict list of attributes	txt xml	xml+xsl	html	+ a1err2.xml	x a1err2.xml:7: element x4entry: Schemas validity error : Element 'x4entry', attribute 'updated': The attribute 'updated' is not allowed. a1err2.xml fails to validate
5.	Mistake: using "d" in exponent of a number inside list:float	txt xml	xml+xsl	html	+ a1err3.xml	x a1err3.xml:169: element dd: Schemas validity error : Element 'dd': '0.5d+2' is not a valid value of the atomic type 'xs.float'. a1err3.xml fails to validate

Created by V.Zerkin, IAEA, 13-May-2013
Last updated: 05/15/2013 09:54:46

x4x3: XSL, XSD (May 2013)

Interactive elements

SUBENT: 12528018

+ BIB Section (descriptive information)

REACTION

- 1 (94-PU-241(N,0),,EN)
Target: [PU-241] Quantity: SF58=[,EN] WebQuantity=[RP]Resonance energy
- 2 (94-PU-241(N,TOT),,WID)
Target: [PU-241] Quantity: SF58=[,WID] WebQuantity=[RP]Resonance width
- 3 (94-PU-241(N,TOT),,SIG,,RES)
Target: [PU-241] Quantity: SF58=[,SIG,,RES] WebQuantity=[CS]Cross section at resonance
- 4 (94-PU-241(N,EL),,WID,,2G)
Target: [PU-241] Quantity: SF58=[,WID,,2G] WebQuantity=[RP]2g * resonance width

ANALYSIS (SLA) Single-level Breit-Wigner analysis.

+ DATA Section (8 x 12)

+ DATA Columns (8)

#	1 DATA	1 DATA-ERR	2 DATA	2 DATA-ERR	3 DATA	3 DATA-ERR	4 DATA	4 DATA-ERR
1	EV	EV	EV	EV	B	B	MILLI-EV	MILLI-EV
1	Value of quantity specified under REACTION	Error in value of quantity, defined under ERR-ANALYS	Value of quantity specified under REACTION	Error in value of quantity, defined under ERR-ANALYS	Value of quantity specified under REACTION	Error in value of quantity, defined under ERR-ANALYS	Value of quantity specified under REACTION	Error in value of quantity, defined under ERR-ANALYS
2	electron-Volts	electron-Volts	electron-Volts	electron-Volts	barns	barns	milli-Electron-Volts	milli-Electron-Volts
3							EV *0.001	EV *0.001

+ DATA Table (8 x 12 = 96)

#	1 DATA	1 DATA-ERR	2 DATA	2 DATA-ERR	3 DATA	3 DATA-ERR	4 DATA	4 DATA-ERR
1	14.74	0.5d+2	0.15	0.05	3660.	120.	6.2	1.
2	15.96	0.08	0.6	0.15	245.	25.	1.8	
3	16.7	0.08	0.25	0.1	360.	20.	1.2	
4	17.85	0.05	0.05	0.09	4670.	250.	3.2	0.8
5	20.75	0.17	0.09	0.1	222.	50.	0.32	
6	21.99	0.24	0.2		37.	15.	0.13	
7	23.04	0.3	0.6	0.25	142.	20.	1.5	
8	24.12	0.16	0.22	0.14	346.	25.	1.4	0.9
9	26.45				625.	35.	4.3	1.3
10	28.97	0.22	0.72	0.1	310.	25.	5.	
11	29.57	0.25	0.05	0.05	320.	100.	0.36	
12	31.03	0.21	0.36	0.1	278.	25.	2.4	0.6

Indication mistake in data value (according to XSD schema)

Empty

EXFOR: XML/XSL test, V.Zerkin, IAEA-NDS, 2009-2013. Validate this XML file on [<http://validator.w3.org>]

Link to online validator with URI=x4.xml

“Optional” XSD (May 2013)

XSD was tested to allow options: elements, attributes, “white space”

Well-formed extended EXFOR XML file:

```
<data nn="12" mm="8">
  <dd > 14.74 0.05 0.15 0.05 3660. 120. 6.2 1. </dd> <about>this point was
corrected by author in 2013</about>
  <dd n="2" > 15.96 0.08 0.6 0.15 245. 25. 1.8 NaN </dd>
  <dd > 16.7 0.08 0.25 0.1 360. 20. 1.2 NaN </dd> comment without tag
  <dd comment2="my comment 2---">17.85 0.05 0.05 0.09 4670. 250. 3.2 0.8</dd>
  <dd n="4" >20.75 0.17 0.09 0.1 222. 50. 0.32 NaN</dd>
  <dd > 21.99 0.24 0.2 NaN 37. 15. 0.13 NaN </dd>
  <dd > 23.04 0.3 0.6 0.25 142. 20. 1.5 NaN </dd>
  <dd > 24.12 0.16 0.22 0.14 346. 25. 1.4 0.9 </dd>
  <dd > 26.45 NaN NaN NaN 625. 35. 4.3 1.3 </dd>
  <dd > 28.97 0.22 0.72 0.1 310. 25. 5. NaN </dd>
  <dd > 29.57 0.25 0.05 0.05 320. 100. 0.36 NaN </dd>
  <dd > 31.03 0.21 0.36 0.1 278. 25. 2.4 0.6 </dd>
</data>
```


5. Concluding remarks

- 1) EXFOR-XML is available for users as output from the Web retrieval system since 2011 with XSL transformation to interactive Html.
- 2) Some further development of elements of technology was done in 2013: XSD schema, online validation, etc.
- 3) Extensive practical knowledge (sharing experience) is needed for further XML development on professional level.
- 4) To be discussed: existing technical options, decisions (and underlying reasons), practical tasks and plans, etc.

Thank you