

PROGRAM INPGRAPH TO INPUT NUMERICAL DATA INTO EXFOR LIBRARY: NEW FEARTURES

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DIGITIZER INPGRAPH TO INPUT NUMERIC DATA INTO EXFOR LIBRARY

- C5
- (1) Centres will be encouraged to publish their EXFOR related activities in journals. NDS will assist it if necessary.
 - (2) Digitization could be a good subject in the NRDC progress report presented in the ND2019 conference.
 - (3) NDS will continue update of an initial draft of the “EXFOR big article” (WP2017-07) as per inputs from centres.
 - (4) The ND2013 article (Nucl. Data Sheets 120(2014)272) will be used for citation by EXFOR users.

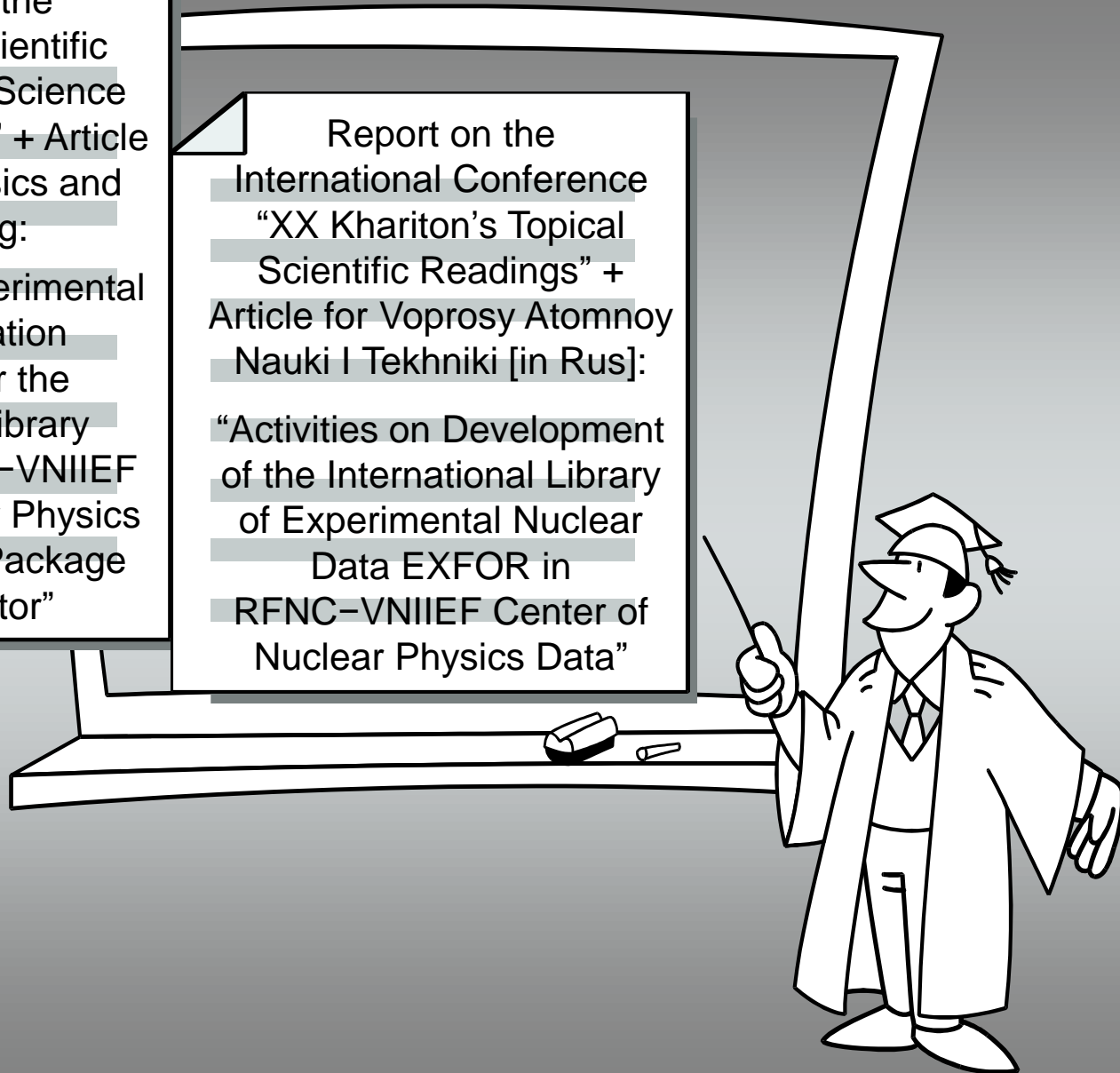


Report on the International Scientific Forum “Nuclear Science and Technologies” + Article for Nuclear Physics and Engineering:

“Activities on Experimental Data Compilation Performed for the International Library EXFOR in RFNC–VNIIEF Center of Nuclear Physics Data. Software Package EXFOR–Editor”

Report on the International Conference “XX Khariton’s Topical Scientific Readings” + Article for Voprosy Atomnoy Nauki I Tekhniki [in Rus]:

“Activities on Development of the International Library of Experimental Nuclear Data EXFOR in RFNC–VNIIEF Center of Nuclear Physics Data”



Generally, digitization is a conversion of an object (in the analogue form) into the form of a set of discrete values using special equipment.

In our case the term «digitization» means getting of numeric data from an image obtained at original document scanning, at copying from a PDF-file or at capturing a part of the screen.

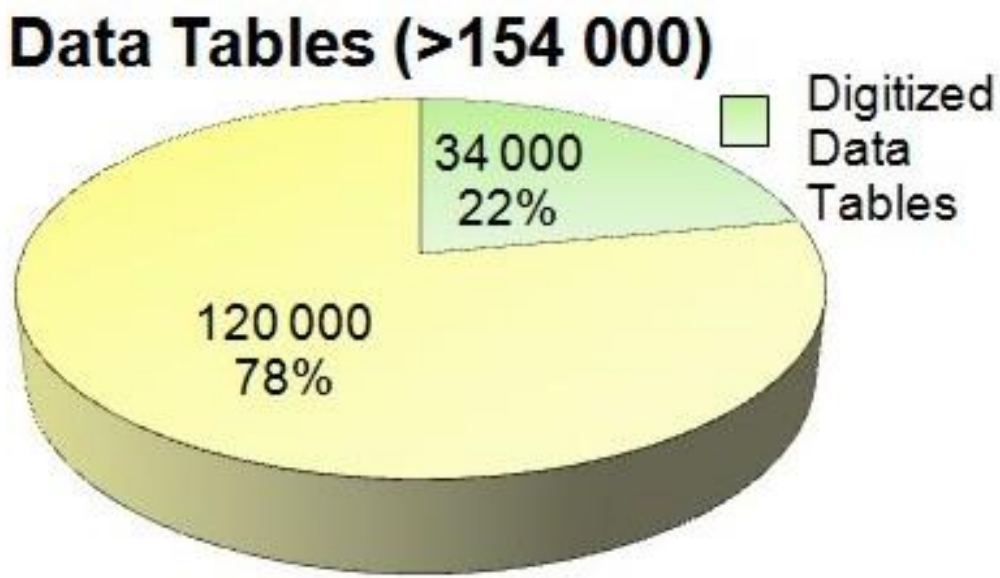
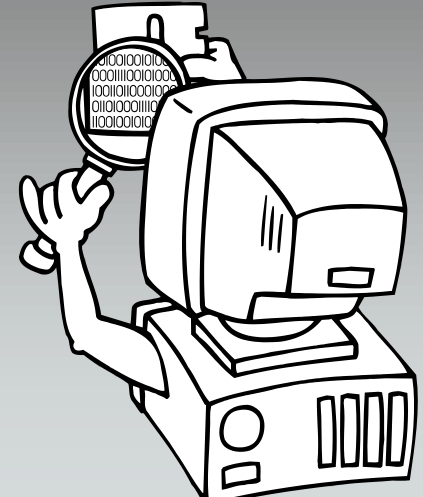
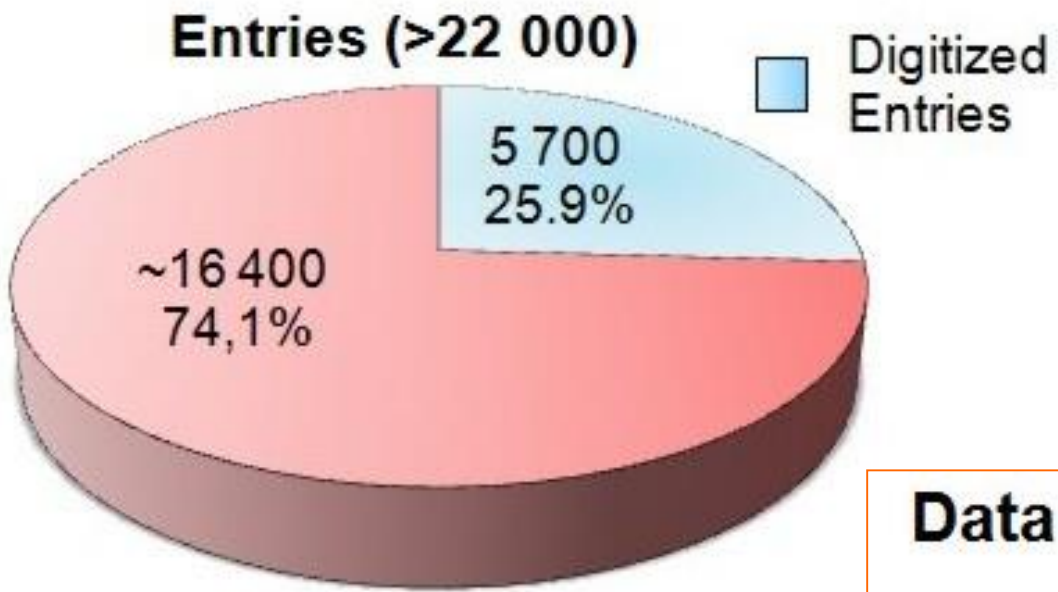
Application of digitizing:

- At working with literature if tables or analytical formulas are inaccessible and the data are available only in the form of plots.
- For comparing measurement results and literary data in the form of plots or for comparing data from several literary sources where the plots are presented.
- At creating and completing databases on literary sources containing graphic information.
- For the tasks of inputting data basing on oscillograms obtained with the aid of a storage oscilloscope at measuring fast processes.



Share of Digitized Data

Exfor Statistics (May 2018)



Digitization increases the EXFOR content considerably.

Input Graph 3.5
Files Processing Image Options Help
New Open Save FOR File Exit 56.2% Zoom
Image Edit Mode C:\MyPrograms\Exfor\ExfInpGraph_WZRD\BMP\Fig4

Entry + Variables Axes Curves
Entry Number
Additional Independent Variables
No On Two
Back Next

Main Menu
Toolbar
Zoom Gauge

Bookmarks of Digitizing Steps

Transfer between Digitizing Steps

$\frac{d\sigma}{d\Omega}, \text{ см}^2/\text{ср}$

$\theta_{\text{зад}} = 30^\circ$

$(0) 150^\circ$

$(0,75 \text{ МэВ}) 30^\circ$

$(0,75, \text{ МэВ}) 150^\circ$

FIG4.PRJ C:\MyPrograms\Exfor\ExfInpGraph_WZRD

Entry + Variables Axes Curves

Curve List

Input	Delete
FIG. 2	
FIG. 3	

Name+Color
FIG. Lime

Additional Independent Variables
E-LVL MEV 0.75
ANG. ADEG 150

Axes
EN.MEV: X Axis 1
DATA.ARB-UNITS: Y Axis 1

Symmetric Error
Point Err X Err Y
ErrMass Y ErrMass XY Min Max

Data Table

Point	Error X	Error Y
0432 0856		0432 0843
0450 0858		0450 0848
0468 0856		0468 0844
0484 0847		0483 0835
0501 0840		0501 0827
0518 0830		0519 0818
0537 0823		0537 0809
0552 0812		0553 0799
0570 0809		0569 0798
0587 0812		0587 0800
0603 0819		0603 0806
0621 0805		0621 0793
0640 0798		0640 0785

Click to add new curve

Input additional variable values

Select axes from lists

Click to start points input

Click to add X error bar

Click to add Y error bar

Click right button to zoom

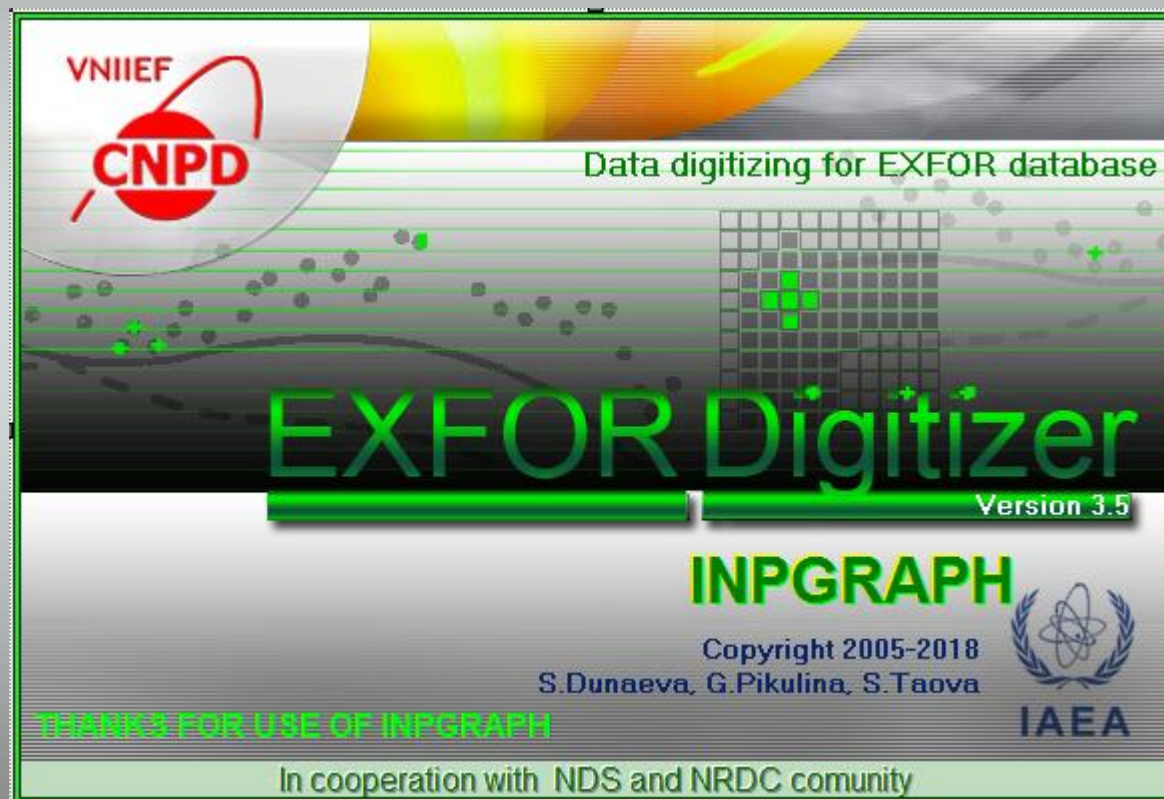
$\frac{d\sigma}{d\Omega}, \text{ см}^2/\text{ср}$

$(0) 150^\circ$

$(0,75 \text{ МэВ}) 30^\circ$

1.5 1.7 1.9

UNDOCUMENTED FUNCTIONS OF THE INPGRAPH 3.5



VNIIEF
CNPD

Data digitizing for EXFOR database


EXFOR Digitizer
Version 3.5

INPGRAPH

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S.Dunaeva, G.Pikulina, S.Taova

THANKS FOR USE OF INPGRAPH

In cooperation with NDS and NRDC community



IAEA

Pre-equilibrium decay process

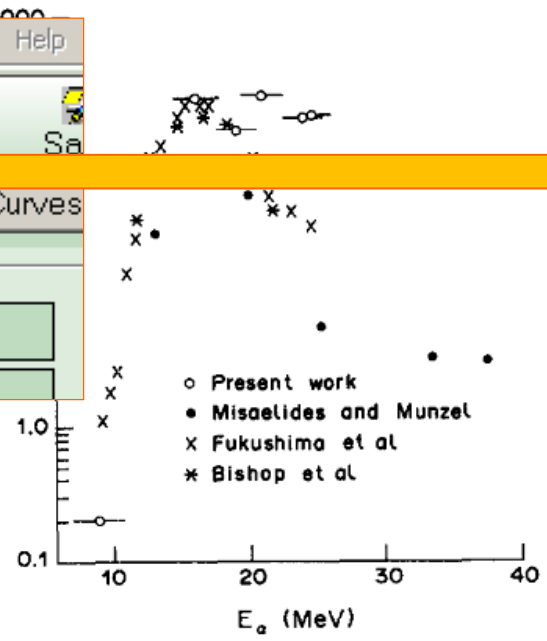
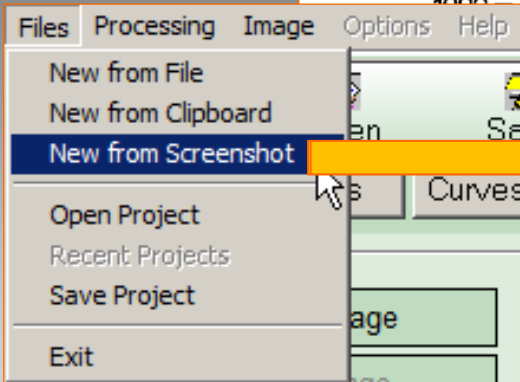


Fig. 2. Experimental excitation function for the reaction $^{107}\text{Ag}(\alpha, n)^{110\text{m}}\text{In}$ (69.1 min).

20 MeV our values are higher than the other reported values. Our results also show a broad peak in the excitation function. The total (α, n) cross-section as a function of the α -particle energy is shown in Fig. 3, along with other reported results (Fukushima *et al.*, 1963; Bishop *et al.*, 1964; Stelson and McGawan,

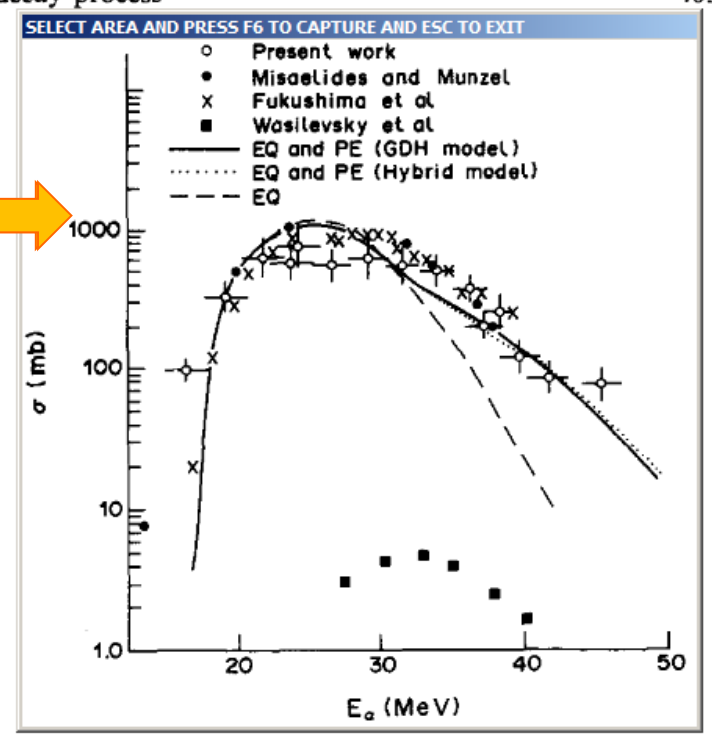


Fig. 4. Experimental and theoretical excitation functions for the reaction $^{107}\text{Ag}(\alpha, 2n)^{109}\text{In}$.

The excitation function for the $^{107}\text{Ag}(\alpha, 2n)^{109}\text{In}$ reaction is shown in Fig. 4 with the results of other measurements. Our results agree with the others except for the broader peak of the excitation function. The results of Wasilevsky *et al.* (1974) are much

Input Graph 3.5

Files Processing Image Options Help

New Open Save **Image Export** EXFOR File Exit

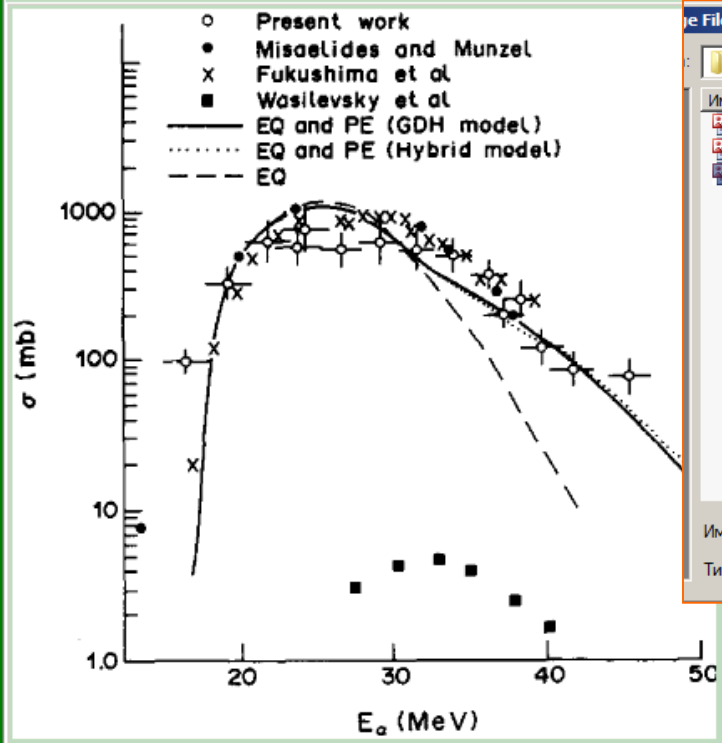
Image Edit Mode Captured Image

Entry + Variables Axes Curves

Entry Number:

Additional Independent Variables: No One Two

Back Next



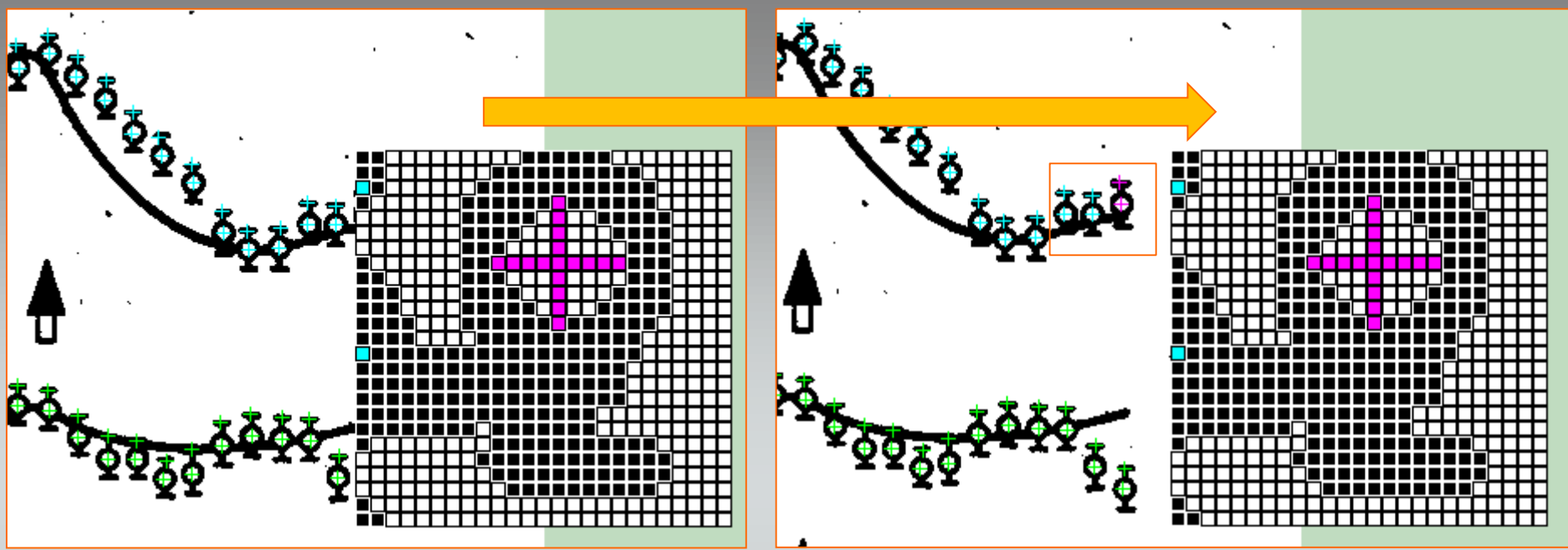
File

BMP

Имя	Размер	Дата изменения
0001.JPG	152 КБ	17.04.2018 12:17
0002.jpg	15 КБ	10.10.2018 16:06
new.jpg	154 КБ	08.10.2018 17:33

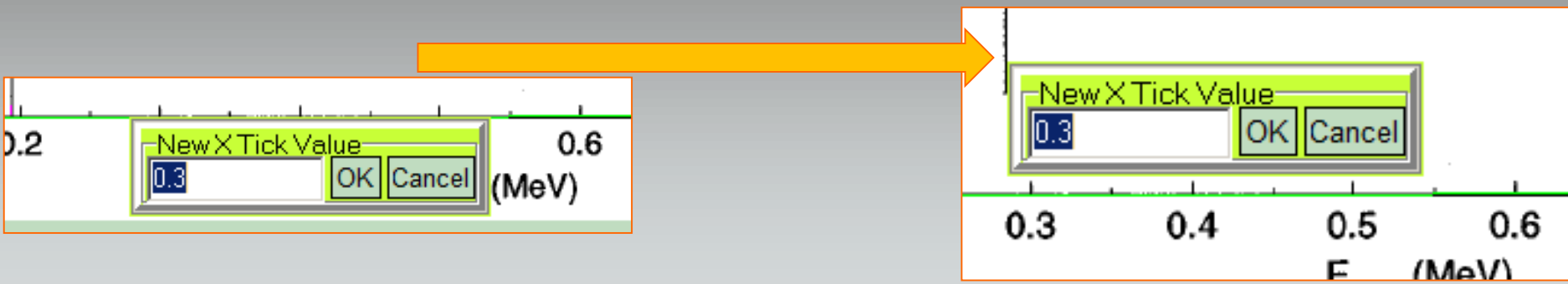
Имя файла: new.jpg Сохранить

Тип файла: JPEG Image (*.jpg) Отмена



Keep pressed the **SHIFT** key button and drag the **Magnifier** window by the left mouse button to the required position.

The contrast colors for point border in the **Magnifier** window are used now.



To drag the **New Tick Value Window** use the left mouse button. Keeping pressed the **SHIFT** key button is not needed in this case.

ErrMass Y Mode

To digitize an array of points with symmetric error bars along Y-axis activate the **ErrMassY** button and click in turn couples of a point and an edge of its Y-error bar. The point should be digitized first.

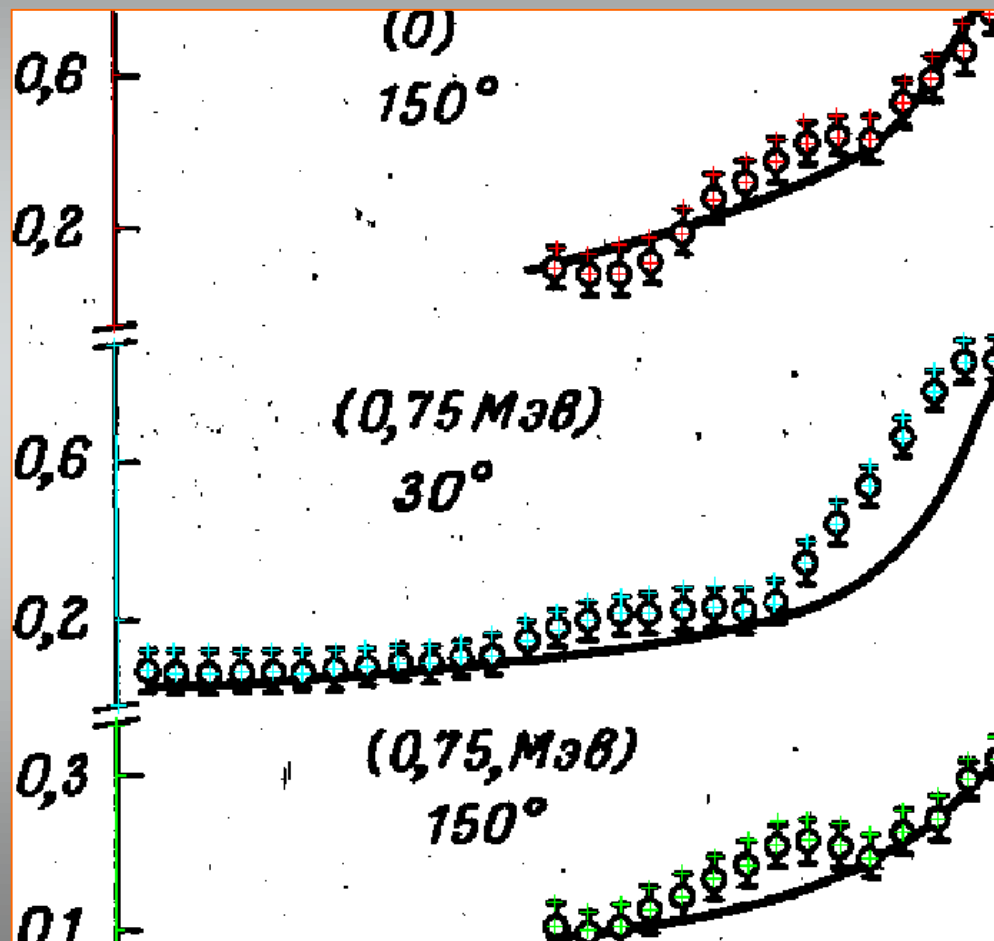
Symmetric Error

Point Err X Err Y

ErrMass Y ErrMass XY Min Max

Data Table

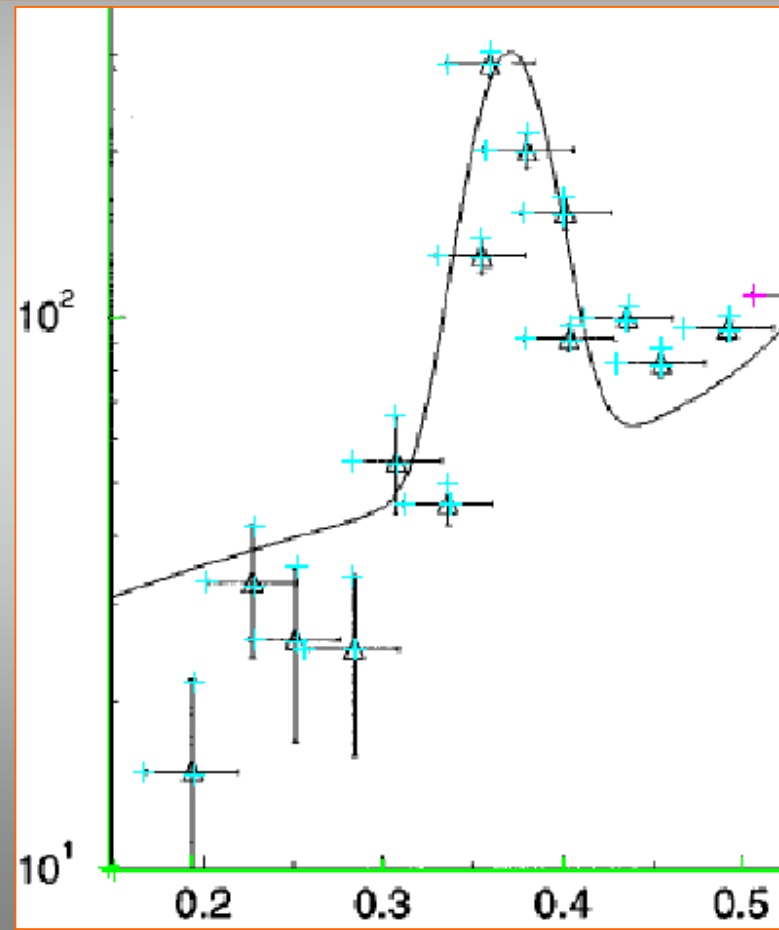
Point	Error X	Error Y
0432 0856		0432 0843
0450 0858		0450 0848
0468 0856		0468 0844
0484 0847		0483 0835
0501 0840		0501 0827
0518 0830		0519 0818
0537 0823		0537 0809
0552 0812		0553 0799
0570 0809		0569 0798
0587 0812		0587 0800
0603 0819		0603 0806
0621 0805		0621 0793



ErrMass XY Mode

To digitize an array of points with symmetric error bars along X-axis and Y-axis activate the **ErrMassXY** button and click in turn groups of three objects – a point and edges of its both error bars . The point should be digitized first, then the X-error and the last one is the Y-error.

<input checked="" type="checkbox"/> Symmetric Error			
Point		Err X	Err Y
ErrMass Y	ErrMass XY	Min Max	
Data Table			
Point	Error X	Error Y	
0122 0434	0102 0433	0122 0397	
0146 0359	0127 0357	0146 0335	
0163 0381	0146 0380	0163 0351	
0186 0384	0166 0384	0185 0355	
0203 0310	0185 0309	0202 0291	
0224 0326	0206 0326	0223 0318	
0236 0228	0219 0227	0236 0220	
0240 0151	0223 0151	0240 0146	
0254 0186	0238 0185	0255 0178	
0269 0211	0253 0210	0269 0204	
0272 0261	0254 0260	0272 0255	
0294 0253	0295 0247	0277 0252	
0308 0271	0308 0264	0290 0270	
0335 0257	0317 0256	0335 0251	
0362 0243	0345 0243	0362 0238	



Min Max Mode

To digitize an array of vertical lines (bars) activate the **Min Max** button and click in turn the start and end points of bars.

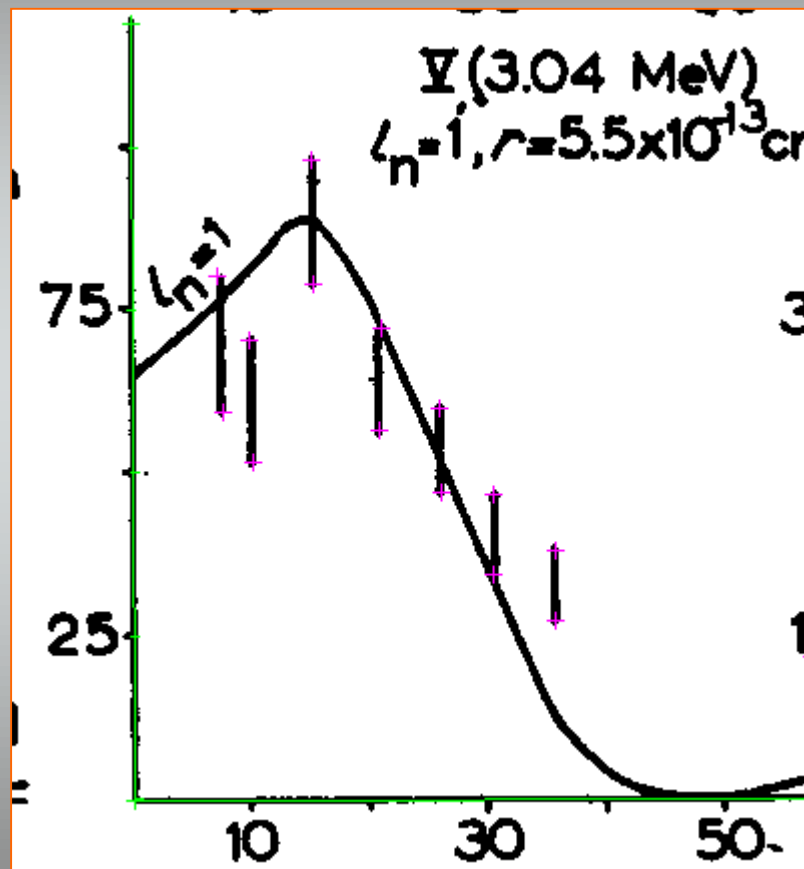
Symmetric Error

Point Err X Err Y

ErrMass Y ErrMass XY **Min Max**

Data Table

First Point	Second Point	
0605 0653	0602 0585	
0620 0678	0618 0617	
0650 0589	0649 0527	
0683 0662	0684 0611	
0714 0693	0713 0651	
0740 0734	0740 0694	
0771 0757	0771 0722	
0900 0801	0899 0775	



ErrMass Y-/+ Mode

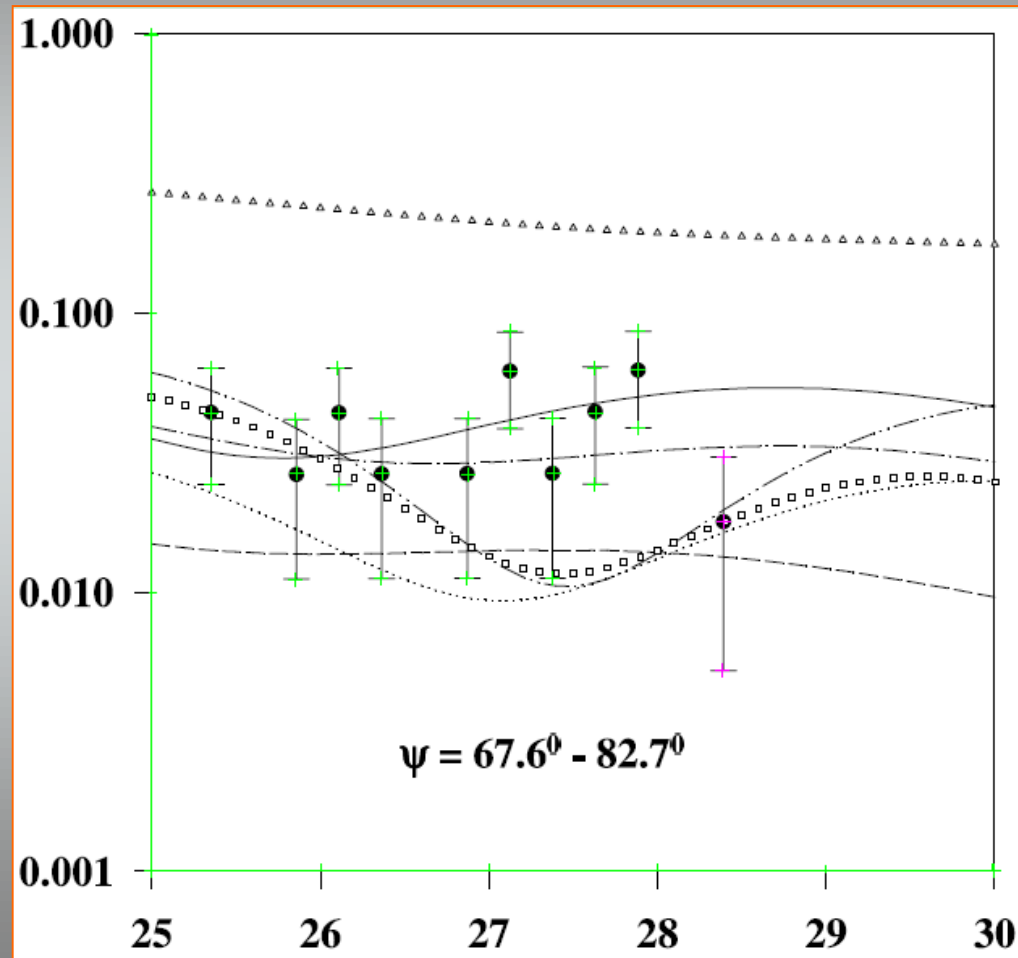
To digitize an array of points with unsymmetrical error bars along Y-axis activate the **ErrMassY-/+** button and click in turn groups of three objects – a point and then minimum and maximum of its Y-error bar.

Symmetric Error

Point
Err X-/+
Err Y-/+

ErrMass Y -/+
ErrMass XY -/+

Data Table				
Point	E...	Er...	Error Y-	Error Y+
0221 0250			0221 0294	0221 0222
0274 0287			0273 0353	0273 0254
0300 0250			0300 0294	0299 0222
0327 0287			0326 0352	0326 0253
0380 0288			0379 0352	0380 0253
0406 0224			0406 0259	0406 0199
0433 0287			0432 0352	0432 0253
0459 0250			0458 0294	0458 0222
0485 0223			0485 0259	0485 0199
0538 0317			0537 0409	0538 0277



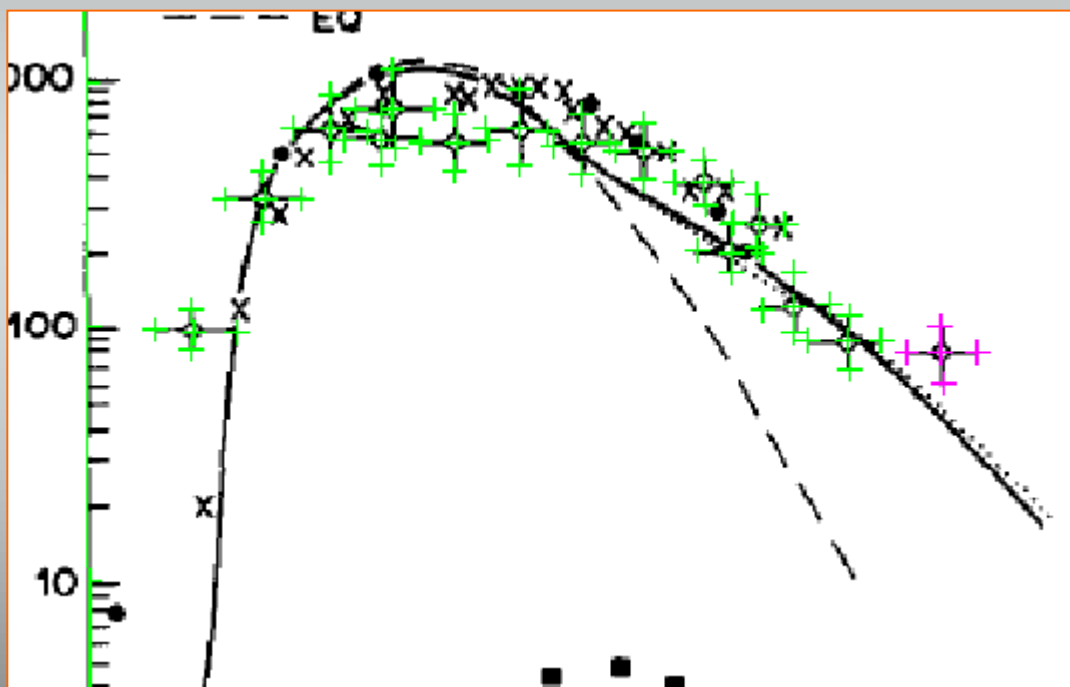
ErrMass XY-/+ Mode

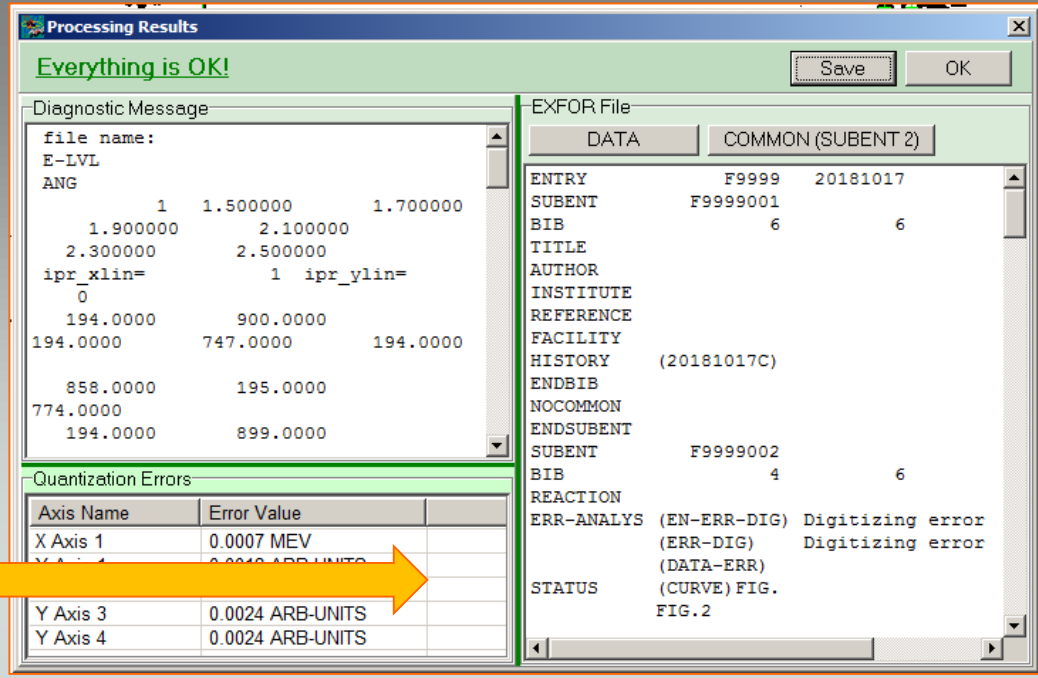
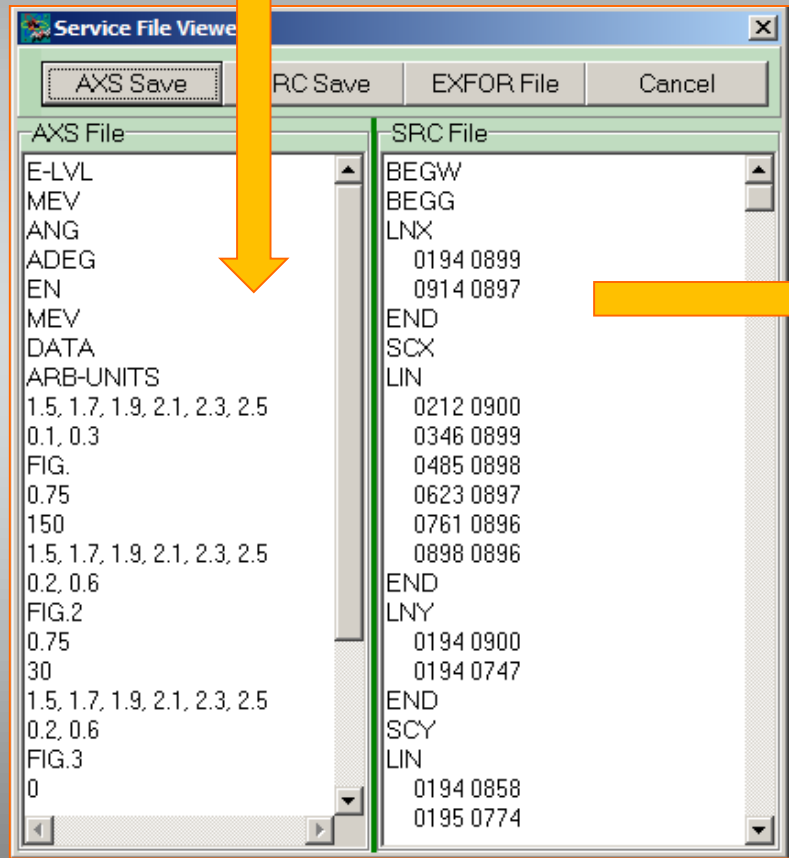
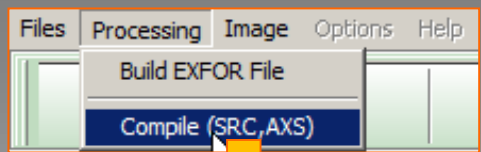
To digitize an array of points with unsymmetrical errors along both axes activate the **ErrMass XY-/+** button and click in turn groups of five objects – a point, then minimum and maximum of its X-error bar and at last minimum and maximum of its Y-error bar.

Symmetric Error

Data Table

Point	Error X-	Error X+	Error Y-	Error Y+
0075 0219	0061 0218	0090 0219	0074 0225	0074 0211
0100 0172	0086 0172	0113 0172	0099 0180	0099 0162
0123 0147	0110 0147	0136 0148	0123 0159	0123 0135
0141 0151	0128 0151	0155 0151	0141 0160	0141 0142
0145 0140	0132 0140	0160 0140	0146 0154	0145 0126
0168 0152	0155 0152	0179 0151	0167 0162	0167 0142
0190 0147	0178 0147	0200 0148	0190 0160	0190 0133
0212 0152	0202 0153	0222 0152	0212 0163	0212 0142
0234 0154	0224 0155	0244 0155	0234 0165	0234 0145
0255 0166	0245 0166	0265 0166	0256 0174	0255 0158
0265 0191	0253 0190	0276 0191	0265 0198	0265 0181
0275 0181	0266 0180	0284 0181	0274 0189	0274 0170
0287 0210	0276 0211	0300 0209	0287 0219	0287 0198
0306 0222	0292 0222	0318 0222	0307 0232	0307 0213
0339 0226	0327 0226	0352 0226	0339 0217	0340 0237





Processing Result

Everything is OK! [Save] [OK]

Diagnostic Message

```

file name:
E
ANG      1      1.500000      1.700000
      1.900000      2.100000
      2.300000      2.500000
ipr_xlin=      1 ipr_ylin=
0
195.0000      900.0000
195.0000      746.0000      195.0000
      859.0000      195.0000
774.0000
195.0000      900.0000
  
```

Quantization Errors

Axis Name	Error Value
X Axis 1	0.0007 MEV
Y Axis 1	0.0012 NO-DIM
Y Axis 2	0.0023 NO-DIM
Y Axis 3	0.0024 NO-DIM
Y Axis 4	0.0023 NO-DIM

EXFOR File

DATA COMMON (SUBENT 2)

```

COMMON      2      3
EN-ERR-DIG  ER-DIG
MEV         NO-DIM
0.58364E-03 13598E-02
ENDCOMMON
DATA      5      138
E         ZG      EN      DATA      DATA-ERR
MEV      DEG      MEV      NO-DIM      NO-DIM
0.75000  50.00    1.8228  0.10631  0.30588E-01
0.75000  50.00    1.8498  0.95479E-010.27052E-01
0.75000  50.00    1.8754  0.10349  0.28235E-01
  
```

COMMON Section

EN-ERR-DIG	ERR-DIG
MEV	ARB-UNITS
1	0.00148

Column

[Add] [Insert] [Copy] [Delete] [Save]

[Rename] [Precision] [Move Left] [Move Right] [Cancel]

Data table

Selected Column: 1 Selected Row: 2

	E	ANG	EN	DATA	DATA-ERR
	MEV	ADEG	MEV	NO-DIM	NO-DIM
67	0.75000	30.000	2.4520	0.40544	0.55810E-01
68	0.75000	30.000	2.4753	0.40036	0.60461E-01
69	0.75000	30.000	2.5016	0.43709	0.51186E-01
70	0.0000	150.00	1.8250	0.91192E-01	0.58523E-01
71	0.0000	150.00	1.8526	0.66294E-01	0.53699E-01
72	0.0000	150.00	1.8775	0.82913E-01	0.65867E-01
73	0.0000	150.00	1.9016	0.10442	0.58563E-01
74	0.0000	150.00	1.9280	0.18199	0.58537E-01
75	0.0000	150.00	1.9551	0.26930	0.63428E-01
76	0.0000	150.00	1.9778	0.30791	0.58510E-01
77	0.0000	150.00	2.0019	0.36845	0.60989E-01
78	0.0000	150.00	2.0261	0.41191	0.56098E-01
79	0.0000	150.00	2.0502	0.43586	0.46355E-01
80	0.0000	150.00	2.0765	0.42806	0.58523E-01
81	0.0000	150.00	2.1021	0.52028	0.58537E-01
82	0.0000	150.00	2.1256	0.58326	0.53632E-01
83	0.0000	150.00	2.1498	0.66087	0.68333E-01
84	0.0000	150.00	2.1711	0.76049	0.60976E-01
85	0.0000	150.00	2.1999	0.96484	0.60962E-01
86	0.0000	150.00	2.2253	0.89852	0.68293E-01
87	0.0000	150.00	2.2514	0.80048	0.58537E-01
88	0.0000	150.00	2.2762	0.79515	0.63415E-01
89	0.0000	150.00	2.3025	0.84589	0.56151E-01

DATA

[Import] [Sort]

[Paste] [Chart]

[Clear] [Check]

Column

[Add] [Insert]

[Copy] [Delete]

[Rename]

[Move Left] [Move Right]

[Calculations]

[Set Value]

[Set Precision]

Row

[Add] [Insert]

[Copy] [Delete]

[Move Up] [Move Down]

Undo

[Undo Last Action]

Table

[Precision] [Clear]

[Export] [Check]

[Clear Check Results]

[Save] [Cancel]

THANK YOU

