FEEDBACK ON COMPILATION TOOLS FROM INDIAN EXFOR COMPILERS

Presented by
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ACKNOWLEDGEMENT:

We express our sincere gratitude to

- The organizer of "EXFOR COMPILATION WORKSHOP," Dr. N. Otsuka for giving us an opportunity to attend the workshop.

- Nuclear Data Physics Centre Of India (NDPCI), Dr. S. Ganesan, Dr. Alok Saxena, and many others for extending their kind support.

- Dr. S. Ganesan, **Raja Ramanna Fellow (Hon) of the DAE Bhabha Atomic Research Centre**, who visited NEHU and guided us during August 21-23, 2013 for our presentations.

- Dr.A.Saxena and Dr.B.Lalremruata for extending their help for the presentation.

EXFOR compilation in INDIA is the outcome of the initiative and efforts undertaken by Nuclear Data Physics Centre Of India(NDPCI).

The mandate of NDPCI as a member of NRDC is to compile all Indian nuclear data physics experiments into EXFOR database .

NDPCI provides projects and funds for EXFOR compilation to be carried out in different Universities in India.

The NDPCI, BARC supports and funds projects for EXFOR compilation.

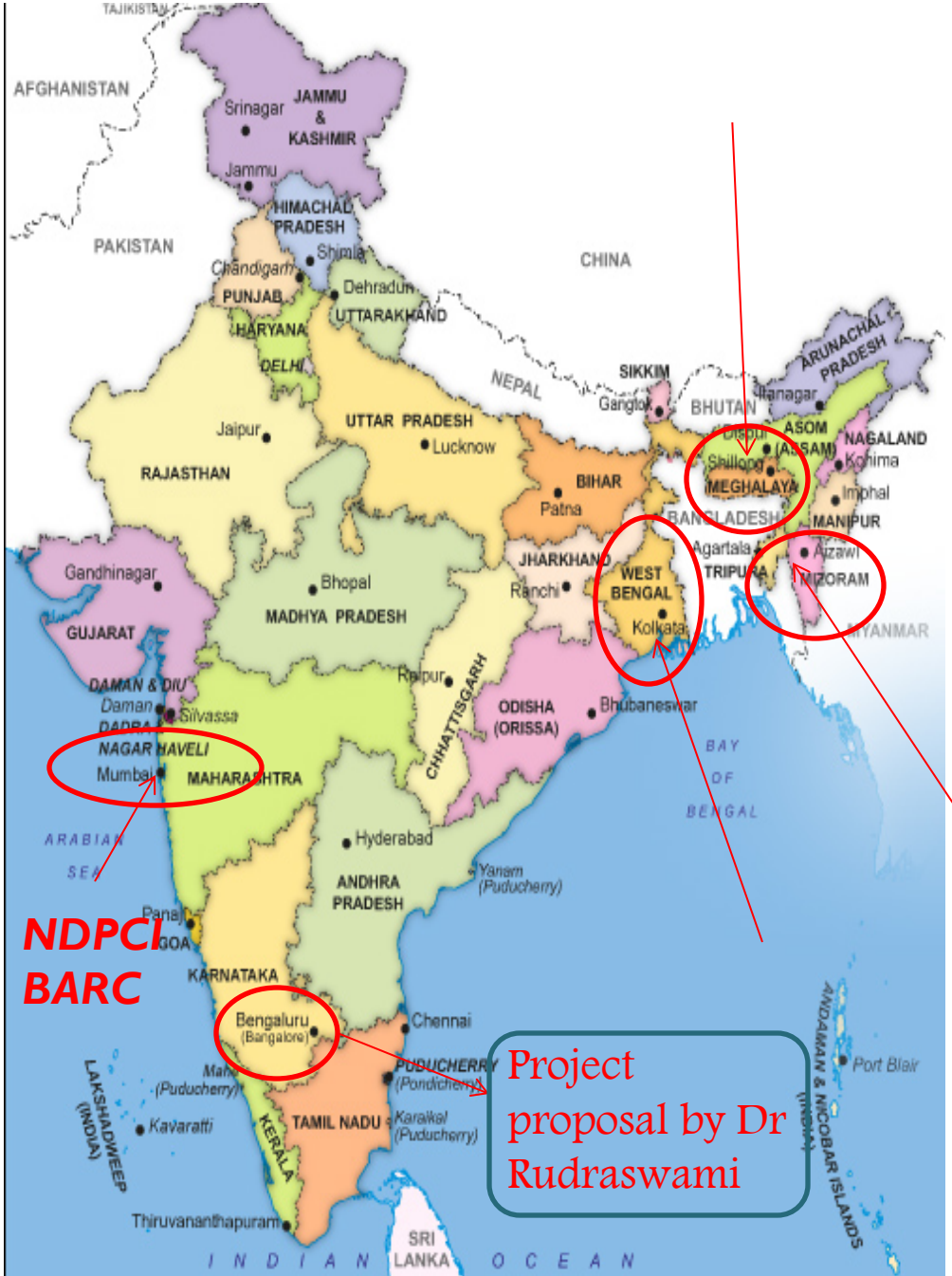
At present, EXFOR compilation is carried out
at three different centers in INDIA:

1.In MIZORAM UNIVERSITY(MZU), AIZAWL
by Dr. B. Lalremruata .

2.In VISHVA-BHARATI UNIVERITY, KOLKATA
by Dr. S.N.Roy, Mr. Uday and Mr. Kalyan .

3.In NORTH EASTERN HILL UNIVERSITY (NEHU), SHILLONG
by Dr. B.M. Jyrwa,
Ms R. Ghosh and Ms S.Badwar.

4.A project proposal on EXFOR is given by Dr Rudraswami in Bangalore.



- In NEHU, the first phase of the project entitled "EXFOR COMPILATION OF NUCLEAR DATA" has been implemented successfully for a period of two years from May 2011-April 2013.

- Now the second phase of the project proposal is going on.

- This proposal involves performing nuclear data physics experiments in addition to actively continuing EXFOR compilation activity.

- The available experimental facilities using neutron sources such as ^{7}Li(p,n) at the FOTIA machine at BARC, D+D, D+T reactions at PURNIMA BARC, ^{7}Li(p,n) at TIFR, PELLETRON, MUMBAI.

- The experiments will be analyzed theoretically at NEHU using nuclear physics models codes such as TALYS(Europe) version 1.4 and Empire(US) version 3.19.

- The experimental guidance will be provided by Dr H.Naik and Dr Suryanarayan, BARC, Mumbai.

EXFOR compilation procedures in India.

	Who	What
1	Compiler	Ask Dr Naohiko a new article.
2	Dr Naohiko	Send a new article with its entry number to the compiler. (Normally figures and tables for compilation are also provided with their REACTION codes.)
3	Compiler	Send authors a request of numerical data
4	Compiler	. Compile the article. Indicate the request of data by (UNOBT) Request sent to A.B.Author by e-mail (year/month/date) under the keyword STATUS. This will be deleted when the compiler receive numerical data.
5	Compiler	Send two files (ordered EXFOR draft and its CHEX output) to Dr. B. Lalremruata when the entry is made.
6	Dr. B. Lalremruata	Check -if BIB information (Title, Author, Institute, Reference) is coded as given in the article. -if CHEX error messages are removed as much as possible. (Ask Dr Naohiko if these messages are not understandable.)
7	Dr. B. Lalremruata	Make correction with the compiler when necessary
8	Dr. B. Lalremruata	Send the corrected file to Dr Naohiko.
9	Dr Naohiko	Do further checking and correct the file with Dr. B. Lalremruata when necessary.
10	Dr Naohiko	Notify Dr. B. Lalremruata and Compiler when the compilation is completed.

Entries compiled by NEHU Team (Dr. B.M.Jyrwa, S.Badwar, R.Ghosh)

Sl. nos	Entry Nos	Journal reference	Year in which entry is assign	Time Taken to finalize the entry	Compiled by
1.	D6095	NPA 96 (1967) 521-528	2010	7 months	Dr B.M.Jyrwa, R Ghosh
2.	D6103	EPJ A 44 (2010) 403-410	2011	4 months	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
3.	D6112	PRAMANA 57 (2001) #1 209-213	2011	4 months	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
4.	D6114	Z.Physik A 278 (1976) 281-290	2011	8 months	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
5.	D6111	PRL 106 (2011) 022501----4	2011	3 months	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
6.	D6149	PRC 52 # 2 (1995) 798-806	2011	1 year 10 months	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
7.	D6166	PRC 44 # 3 (1991) 1049-1056	2011	5 months	Dr B.M.Jyrwa, R Ghosh, S.Badwar.

Sl. nos	Entry Nos	Journal reference	Year in which entry is assign	Time Taken to finalize the entry	Compiled by
8.	D6129	PRC 49,#2, 932 (1994)	2011	1 month 4 days	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
9.	D6083	Eur.Phys.J.A, 44, 385-392,(2010)	2012	7days	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
10.	D6133	Pramana J.Phys 27, #3365-379 (1989)	2012	1 month 3 days	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
11.	D6158	J.Phys. G. Nucl. Part. Phys 35 025101 (2008)	2012	1 month approximately	Dr B.M.Jyrwa, R Ghosh, S.Badwar.
12.	D6152	PRC 53 #2 803-810 (1996)	2012	1 month	Dr B.M.Jyrwa, S.Badwar.
13.	D6156	ITB Hannover +495117628998 Seite 2 von 3 (2012)	2012	1 month 3 days	Dr B.M.Jyrwa, R Ghosh.
14.	D6157	Pramana 52 # 6 609-621 (1999)	2012	1 month	Dr B.M.Jyrwa, R Ghosh.
15.	D6169	PRC 81 054607 (2010)	2012	1 month 10 days	Dr B.M.Jyrwa, S.Badwar.

Sl. nos	Entry Nos	Journal reference	Year in which entry is assign	Time Taken to finalize the entry	Compiled by
16.	D6165	International Journal of Modern Physics E 14 # 7 (2005) (1063-1071)	2012	4 months 9days	Dr B.M.Jyrwa, R Ghosh.
17.	D6132	Pramana J. Phys 27 # 6 (1986) 747-760	2013	4 months	Dr B.M.Jyrwa, S.Badwar.
18.	D6173	Eur. Phys. J.A 47 156 (2011)	2013	8 days	Dr B.M.Jyrwa, S.Badwar.
19.	D6188	PRC 84, 011602(R) (2011)	2013	3 days	Dr B.M.Jyrwa, S.Badwar.
20.	D6171	CHINESE JOURNAL OF PHYSICS. 49, # 4, 884	2013	1 day	Dr B.M.Jyrwa, R Ghosh.
21.	D6190	PRC 84, 024614 (2011)	2013	1 day	Dr B.M.Jyrwa, R Ghosh.
22.	D6208	J.ARI, 41, 401(1990)	2013	2 months 8 days	Dr B.M.Jyrwa, S.Badwar.
23.	D6207	Nucl.Instrum.Meth.A 576(2007)380	2013	1 month 5 days	Dr B.M.Jyrwa, R Ghosh.
24.	33046	Eur.Phys.J.A 16, 495 (2003)	2013	under	Dr B.M.Jyrwa, R

Feedbacks And Suggestions on Digitizer and Editor from NEHU compilers:

- There are different softwares which can be used for EXFOR compilation .

- However, we (B.M.Jyrwa, Ms Reetuparna Ghosh and Ms Sylvia Badwar), utilizes the following software for compiling our entries;

➢ EDITOR:

The Russian EXFOR editor

➢ DIGITIZER:

Japanese GSYS 2.4.3

FEEDBACK AND SUGGESTIONS ON DIGITIZER

- We present our feedback and suggestions on GSYS digitizer.

- We feel that this may help to update the software to make it more user friendly and thereby improve the quality of digitization.

❖Figures having curves with a multiplication factor:

- On digitizing figures with curves having a multiplication factor using GSYS 2.4.3.

- We digitized the points as usual avoiding the multiplication factor during the process of digitization.

- So in order to get the true value of the data points, the digitized data file obtained after digitization has to be carried manually to EXCEL for incorporating the multiplication factor.

- Thus we feel it will be more helpful if the GSYS Digitizer provides us an option to in corporate the multiplication factor while doing the digitization itself just like in the case of Russian Digitizer to avoid manual errors.

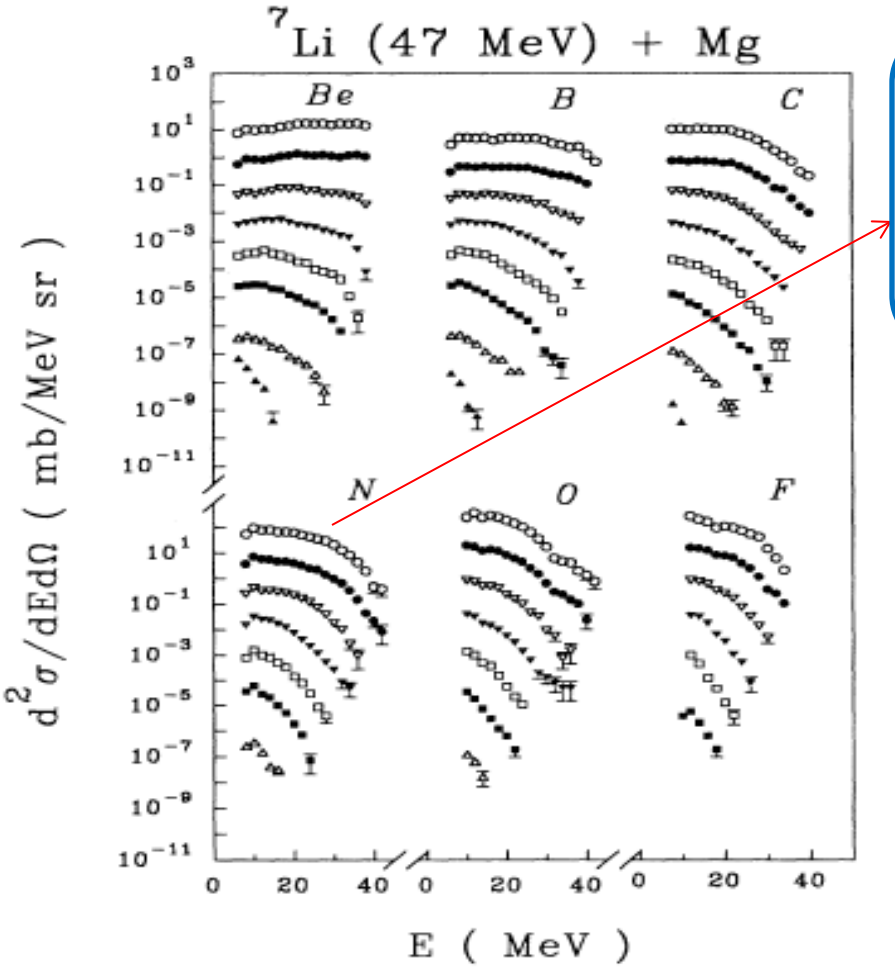


FIG. 2. $\frac{d^2\sigma}{dEd\Omega}$ for different fragments emitted in the reaction ^{7}Li (47 MeV) + Mg plotted as a function of the laboratory kinetic energy of the fragments. The open circle, filled circle, open inverted triangle, filled inverted triangle, open square, filled square, open triangle and filled triangle symbols correspond to the experimental data for the laboratory angles (multiplication factor) of $15°(\times 10^2)$, $20°(\times 10^1)$, $30°(\times 1)$, $40°(\times 10^{-1})$, $50°(\times 10^{-2})$, $60°(\times 10^{-3})$, $70°(\times 10^{-4})$, and $120°(\times 10^{-5})$, respectively.

The open circles are experimental data points corresponding to Laboratory angle(multiplication factor) of 15 degree (*10^2)

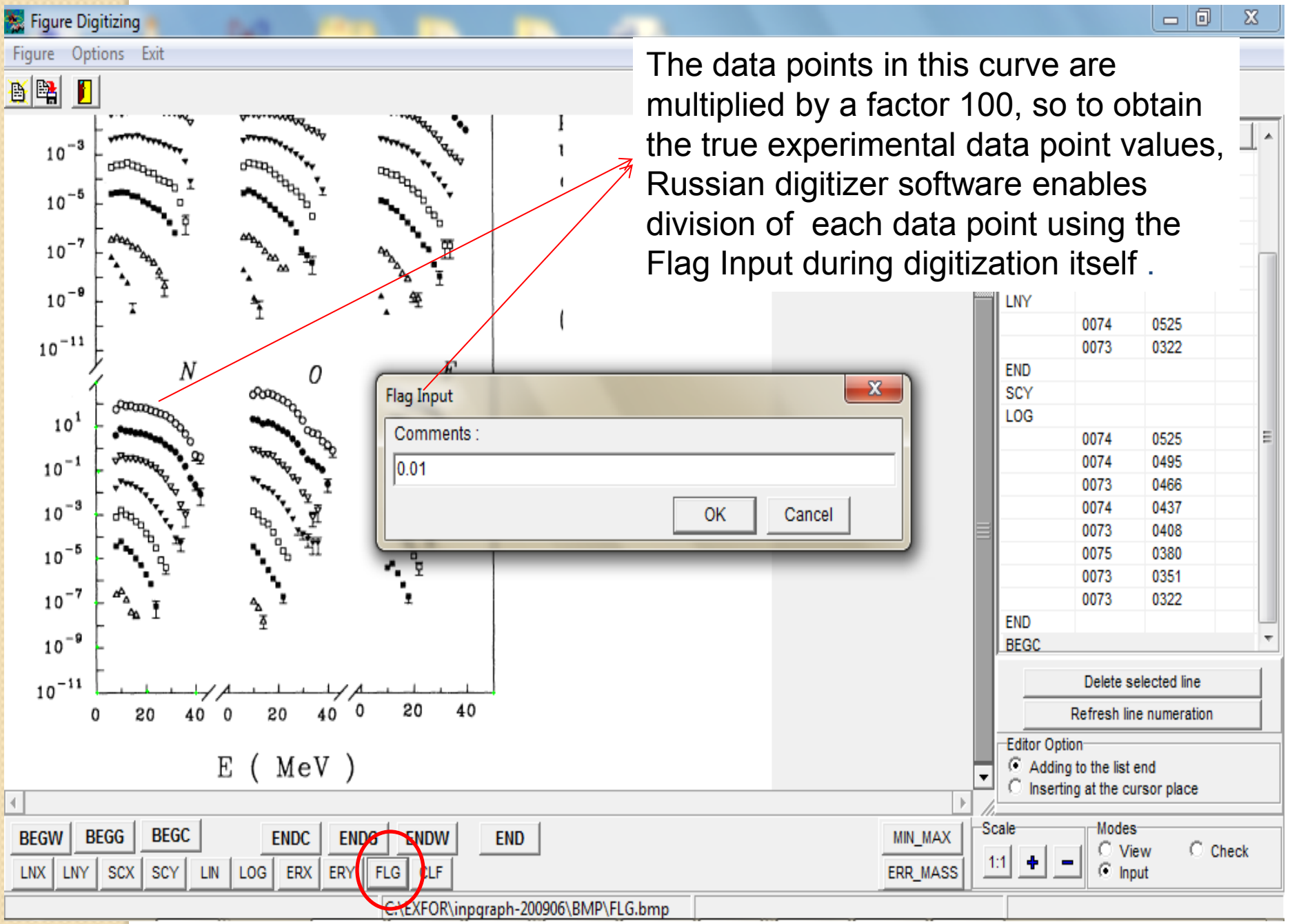


Figure Digitizing
Figure Options Exit
The data points in this curve are multiplied by a factor 100, so to obtain the true experimental data point values, Russian digitizer software enables division of each data point using the Flag Input during digitization itself .
Flag Input
Comments :
0.01
OK
Cancel
E (MeV)
LNY
0074 0525
0073 0322
END
SCY
LOG
0074 0525
0074 0495
0073 0466
0074 0437
0073 0408
0075 0380
0073 0351
0073 0322
END
BEGC
Delete selected line
Refresh line numeration
Editor Option
Adding to the list end
Inserting at the cursor place
BEGW BEGG BEGC ENDC ENDG ENDW END
LNX LNY SCX SCY LIN LOG ERX ERY FLG CLF
MIN_MAX
ERR_MASS
Scale
1:1
Modes
View
Input
Check
C:\EXFOR\inpgraph-200906\BMP\FLG.bmp

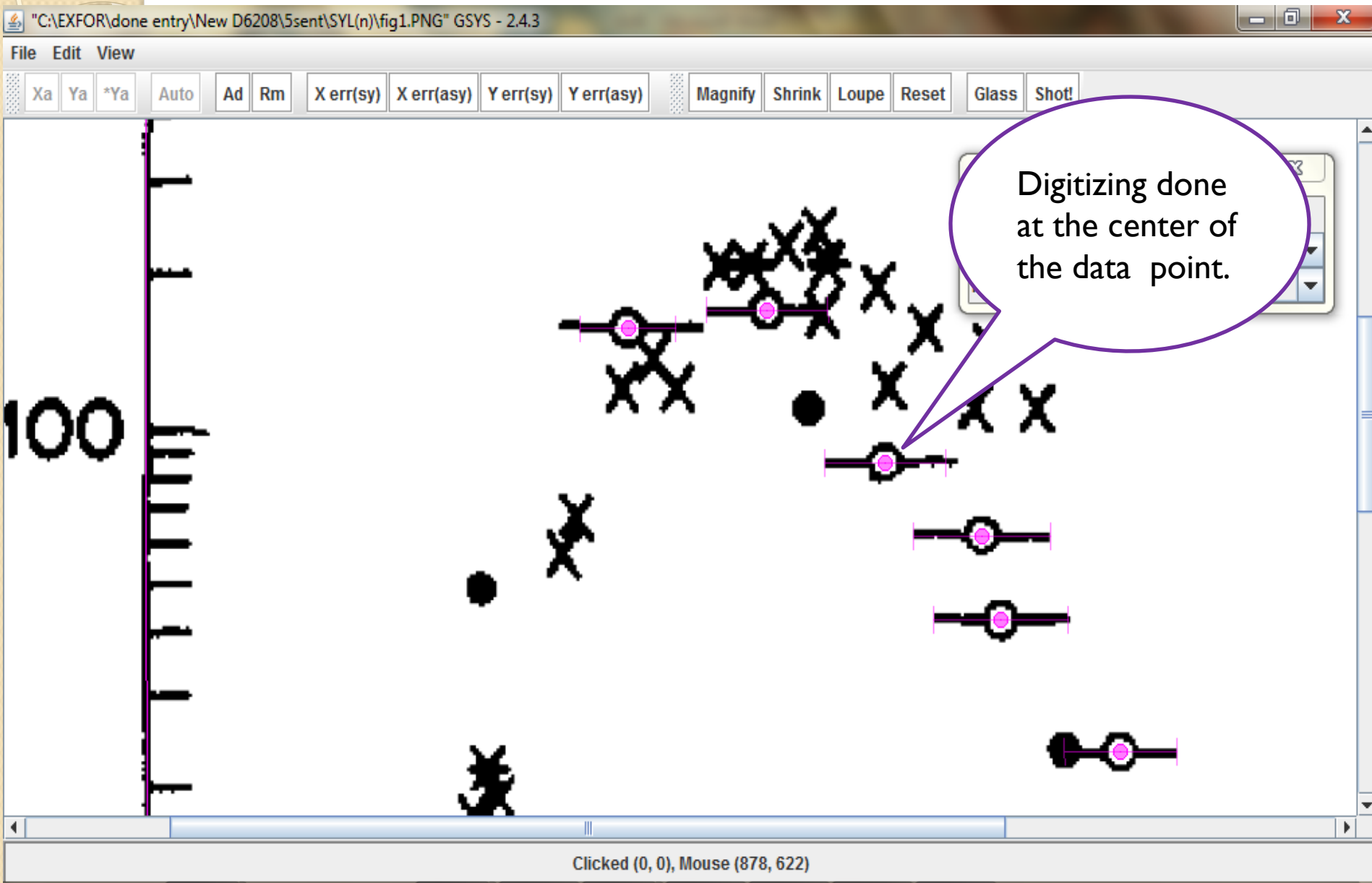
❖Lost of accuracy of the digitized data:

- ❖To avoid loss of fidelity it is important to keep sufficient number of digits in the output file after digitization.

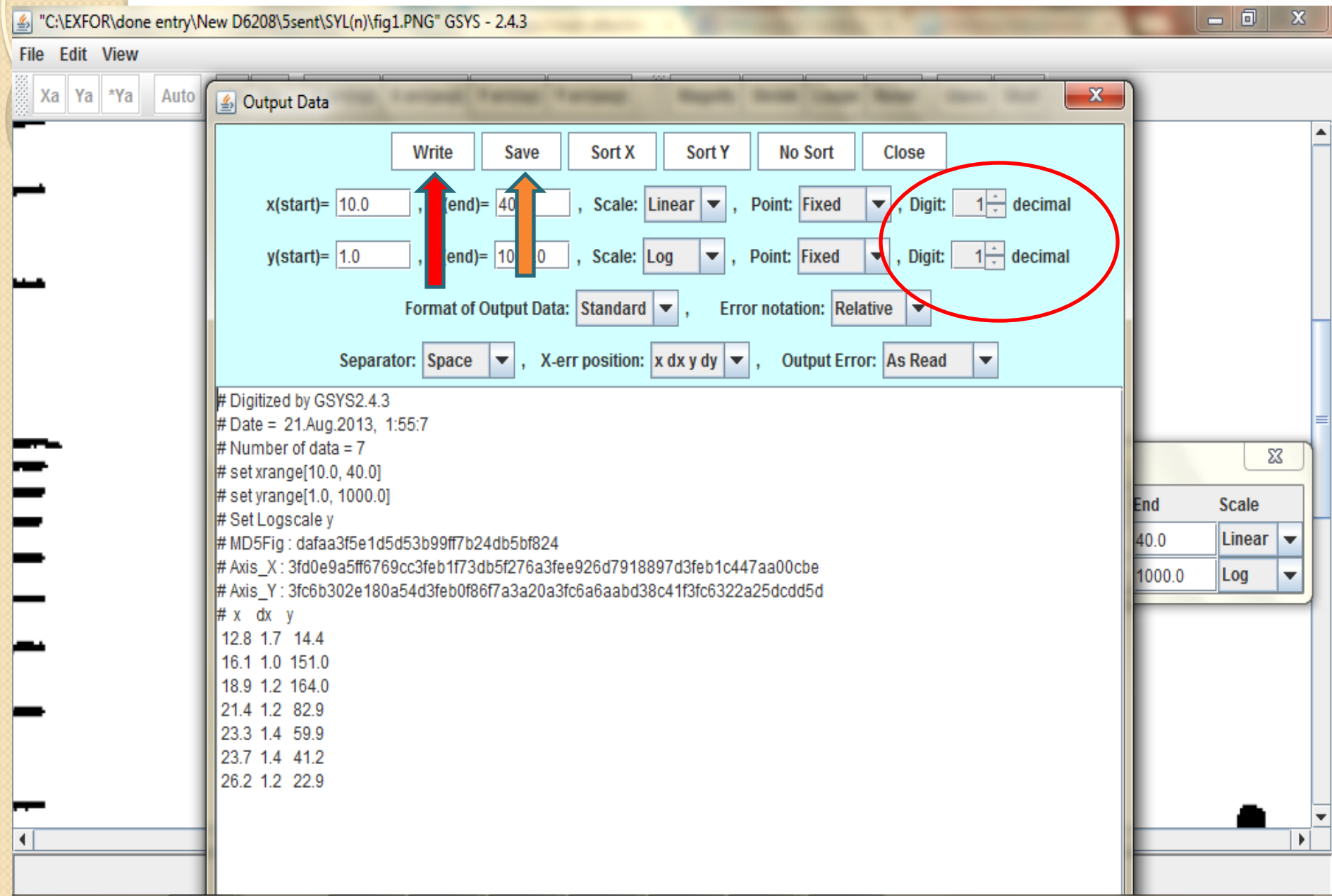
- ❖It is seen that the digitized data with insufficient number of digits when superimpose on the original graphs, shifts from central position are observed.

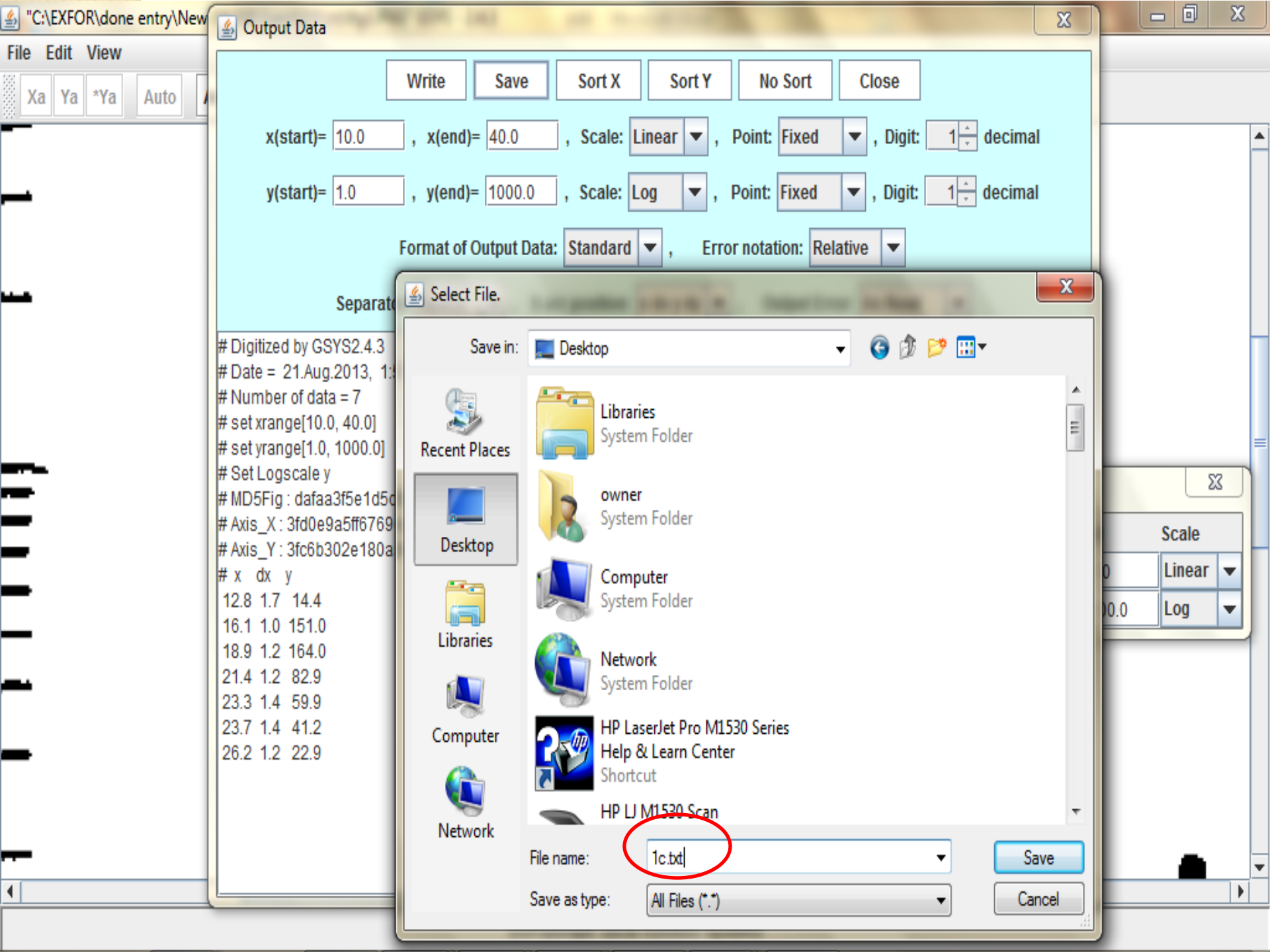
- ❖An example of shift in position is highlighted below where we have an output file with digitized data kept to only one decimal place.

1. Digitization is performed as usual.

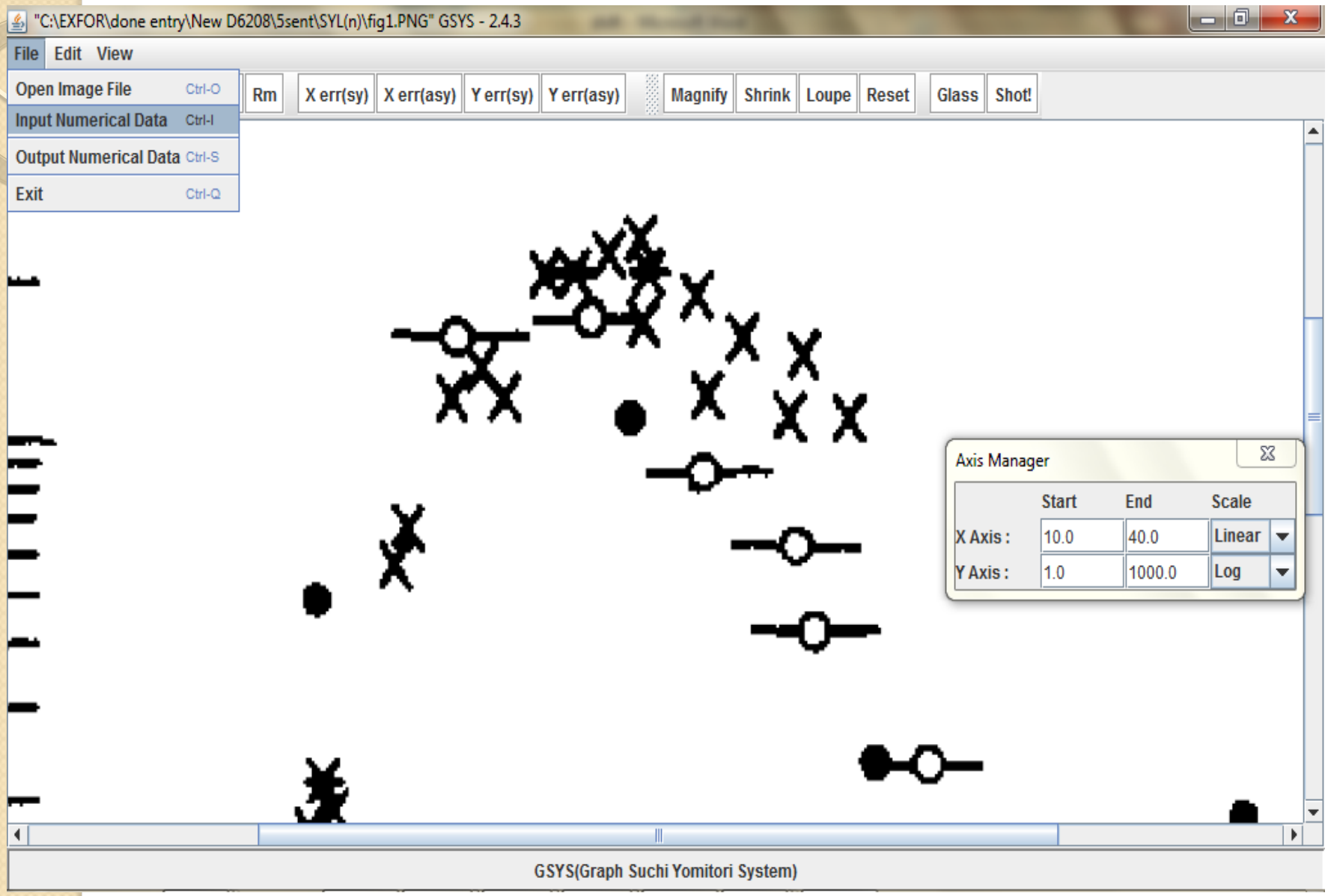


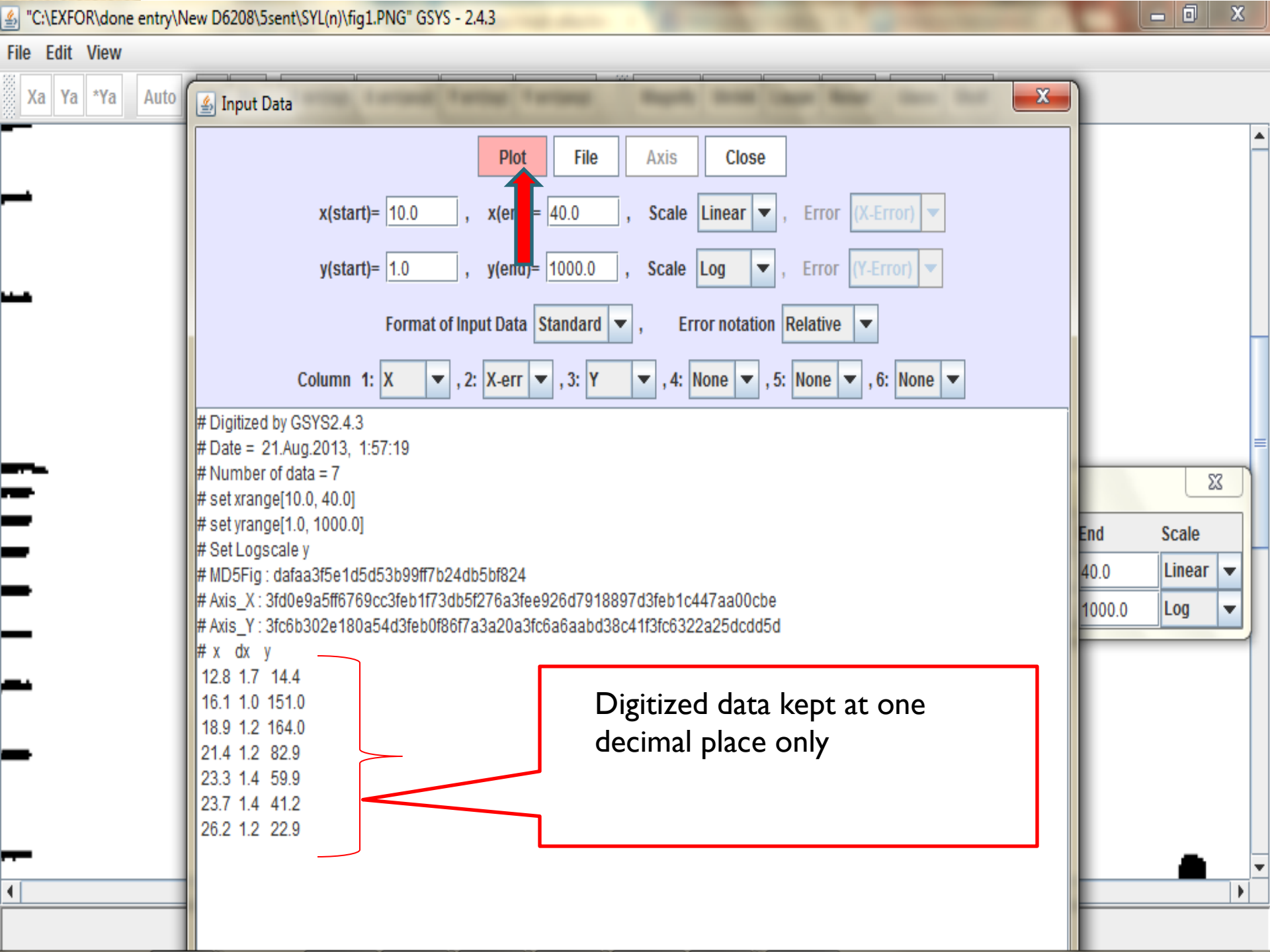
2.The output of the digitized data is kept as shown:



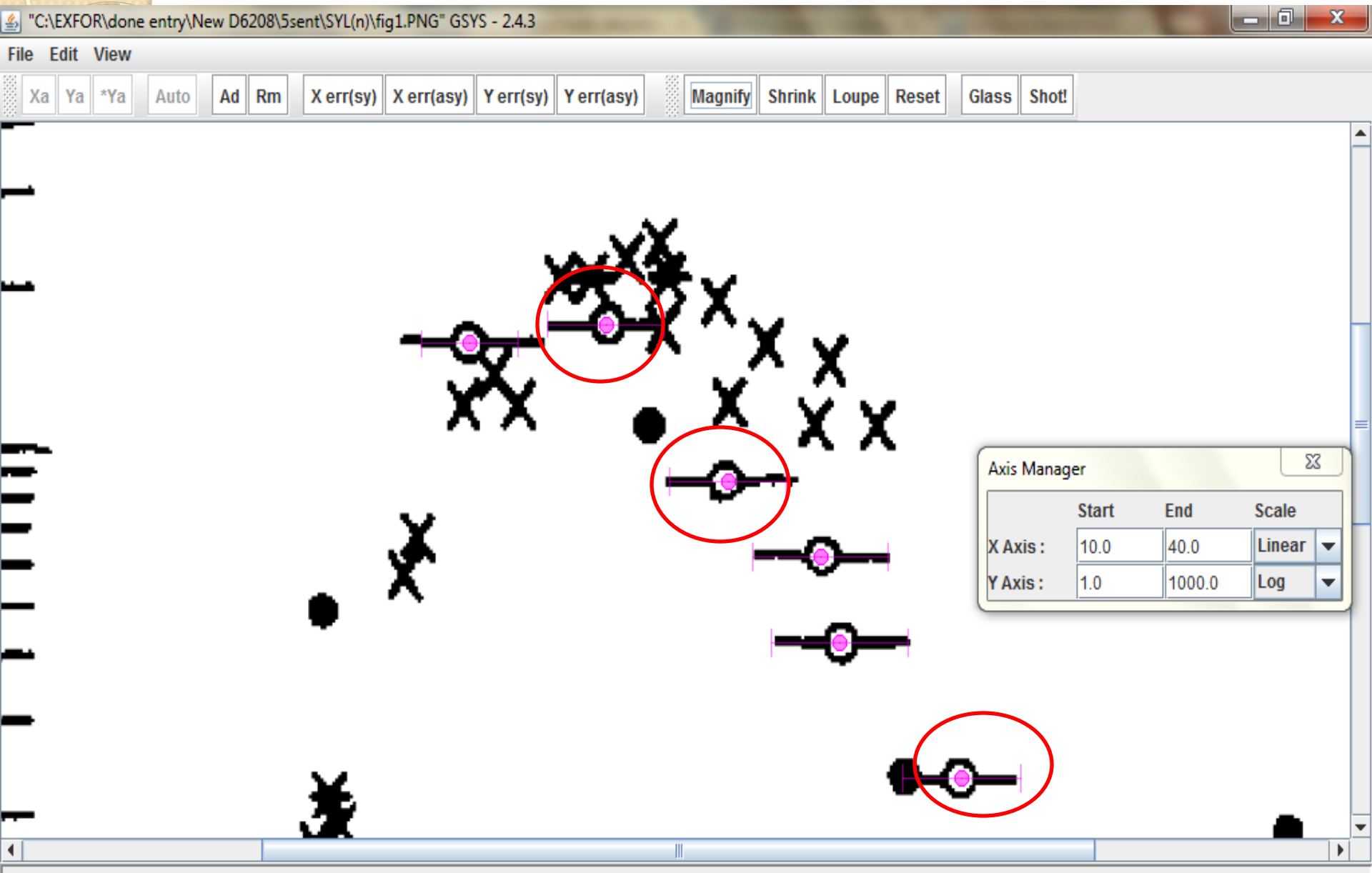

"C:\EXFOR\done entry\New
File Edit View
Xa Ya *Ya Auto
Output Data
Write Save Sort X Sort Y No Sort Close
x(start)= 10.0 , x(end)= 40.0 , Scale: Linear , Point: Fixed , Digit: 1 decimal
y(start)= 1.0 , y(end)= 1000.0 , Scale: Log , Point: Fixed , Digit: 1 decimal
Format of Output Data: Standard , Error notation: Relative
Separat
Digitized by GSYS2.4.3
Date = 21.Aug.2013, 1:
Number of data = 7
set xrange[10.0, 40.0]
set yrange[1.0, 1000.0]
Set Logscale y
MD5Fig : dafaa3f5e1d5c
Axis_X : 3fd0e9a5ff6769
Axis_Y : 3fc6b302e180a
x dx y
12.8 1.7 14.4
16.1 1.0 151.0
18.9 1.2 164.0
21.4 1.2 82.9
23.3 1.4 59.9
23.7 1.4 41.2
26.2 1.2 22.9
Select File.
Save in: Desktop
Recent Places
Desktop
Libraries
Computer
Network
Libraries
System Folder
owner
System Folder
Computer
System Folder
Network
System Folder
HP LaserJet Pro M1530 Series
Help & Learn Center
Shortcut
HP LJ M1530 Scan
File name: 1c.txt
Save as type: All Files (*.*)
Save
Cancel
Scale
Linear
Log

3.Superimposing the output file on the same figure image:




"C:\EXFOR\done entry\New D6208\5sent\SYL(n)\fig1.PNG" GSYS - 2.4.3
File Edit View
Xa Ya *Ya Auto
Input Data
Plot File Axis Close
x(start)= 10.0 , x(end)= 40.0 , Scale Linear , Error (X-Error)
y(start)= 1.0 , y(end)= 1000.0 , Scale Log , Error (Y-Error)
Format of Input Data Standard , Error notation Relative
Column 1: X , 2: X-err , 3: Y , 4: None , 5: None , 6: None
Digitized by GSYS2.4.3
Date = 21.Aug.2013, 1:57:19
Number of data = 7
set xrange[10.0, 40.0]
set yrange[1.0, 1000.0]
Set Logscale y
MD5Fig : dafaa3f5e1d5d53b99ff7b24db5bf824
Axis_X : 3fd0e9a5ff6769cc3feb1f73db5f276a3fee926d7918897d3feb1c447aa00cbe
Axis_Y : 3fc6b302e180a54d3feb0f86f7a3a20a3fc6a6aabd38c41f3fc6322a25dcdd5d
x dx y
12.8 1.7 14.4
16.1 1.0 151.0
18.9 1.2 164.0
21.4 1.2 82.9
23.3 1.4 59.9
23.7 1.4 41.2
26.2 1.2 22.9
End Scale
40.0 Linear
1000.0 Log
Digitized data kept at one decimal place only

4.On selecting ‘Plot’ shifting of the digitized data from the center is observed:



- But after digitization when the output file is kept with numerical data consisting of two places of decimal and on superimposing such output file on the graph, it does not exhibit any shift.

- However we have also encountered that for some figures when the output file contain numerical data with two decimal places shift is still observed(e.g. fig 2a which was given as an exercise for benchmark in 2012)

- In such cases we need additionally one more digit to avoid shifting of the data from its center.

- Hence it is still not clear uniquely about the number of decimal places to be kept after digitization to avoid such shift in data point.

Feedback On Russian Editor :

1.BLANK SPACES:

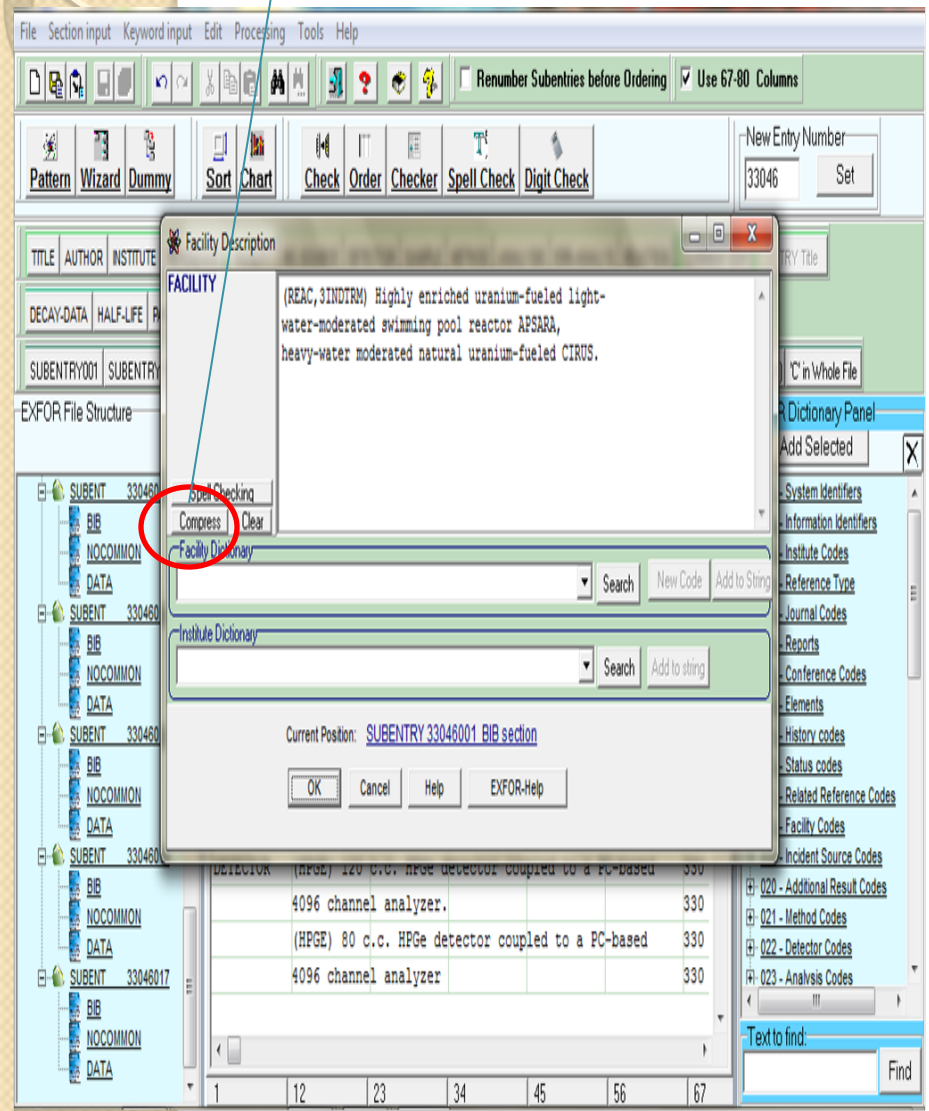
- To remove extra blank spaces in free text during each EXFOR compilation, we always select 'COMPRESS' button .

- But we often get feedback from prior reviewer (Dr N.Otsuka, IAEA and Dr.B.Lalremruata, MIZORAM UIVERSITY, AIZAWL) that extra blank spaces still exist in free text and need to be remove.

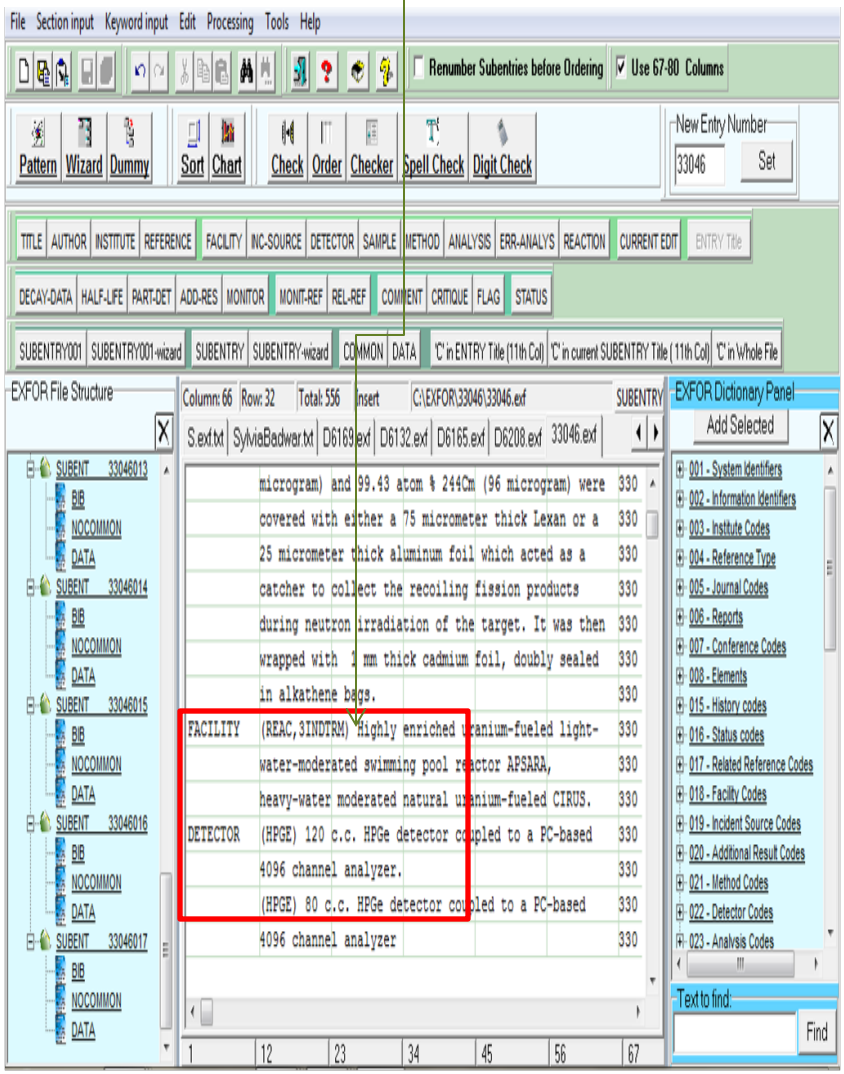
- We also do insert a blank space between a coded information and free text in the EXFOR editor while compiling an entry.

- However it always shows there exist no space between them when the compiled entry is sent for correction.

To remove extra blank spaces.



Space added between coded information and free text.



2.Operator used in reaction code:

- The operator '/' is used in reaction codes for ratios of two or more quantities.

- It is always kept at the end of the record

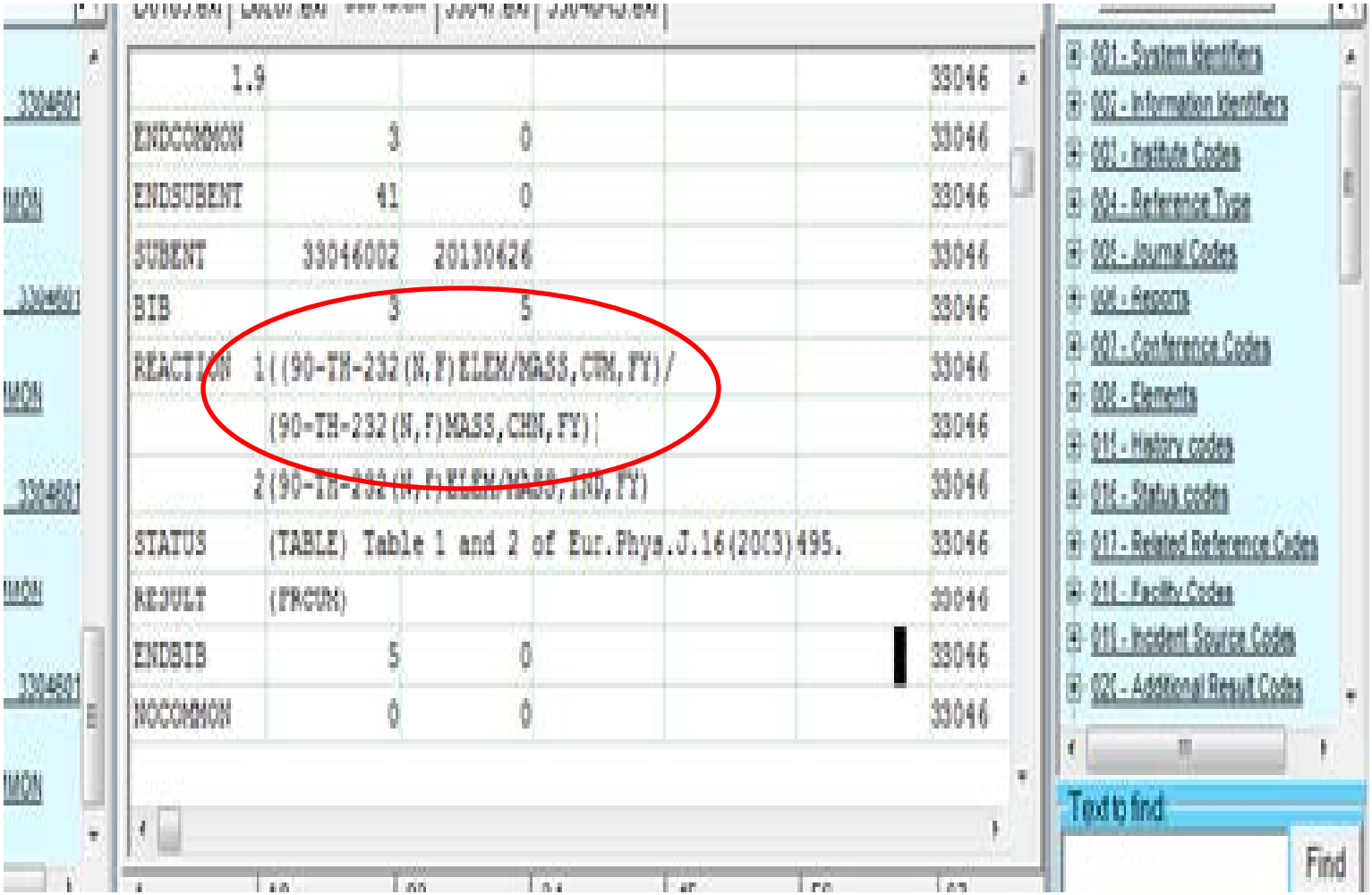
- However on doing so we encountered an error

when we run the 'CHECK' button during our EXFOR compilation.

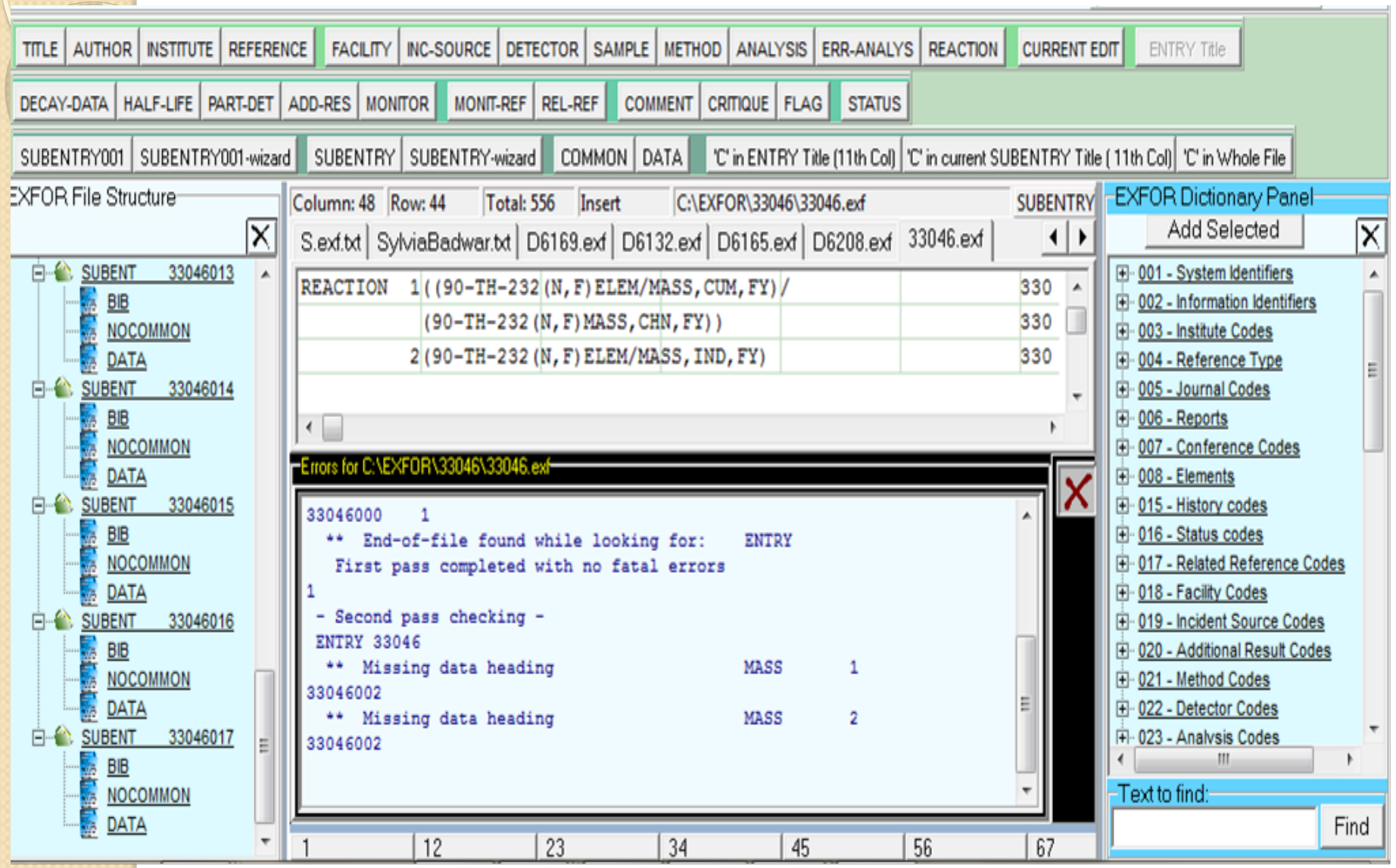
```
- Second pass checking -
ENTRY 33046
 **  Missing data heading                MASS      1
33046002
 **  Missing data heading                MASS      2
33046002
```

- But keeping the operator in the second line of the reaction code we do not face any error messages after running the 'CHECK'.

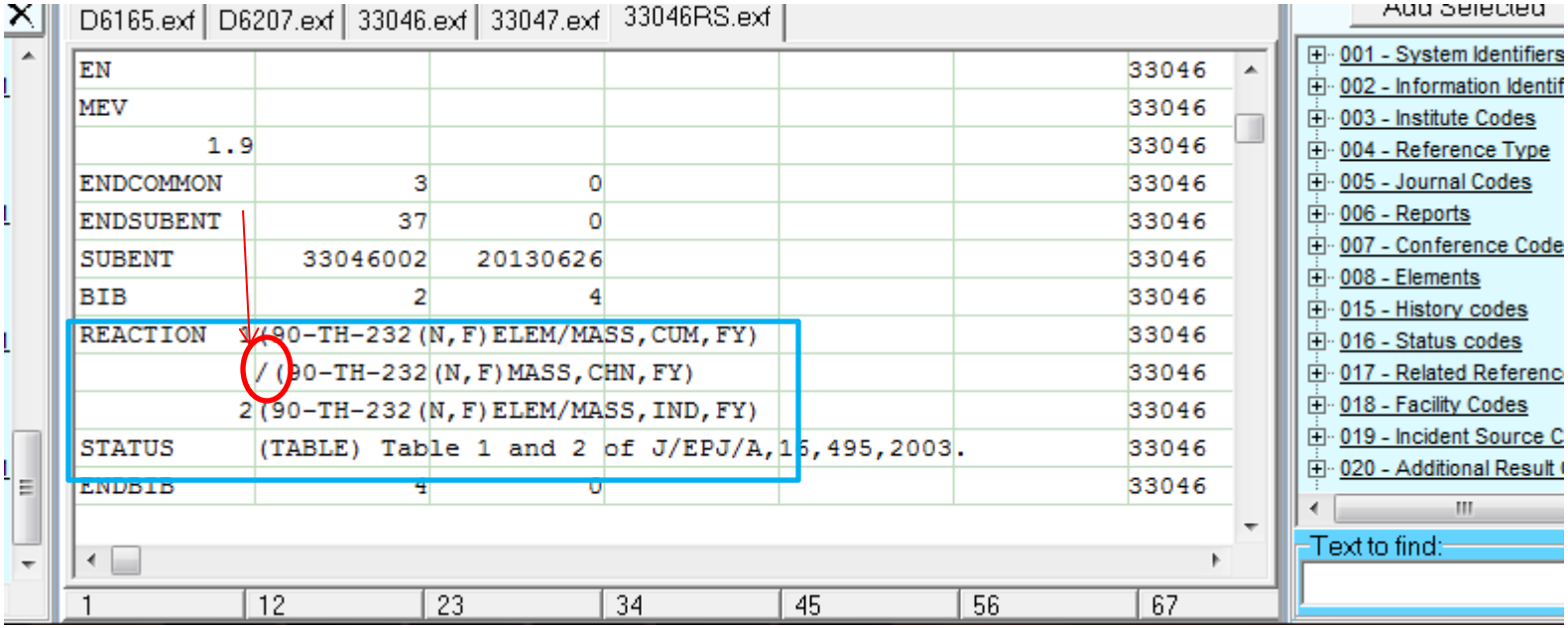
➢On running the 'CHECK' with the reaction code below we get an error message:



Using the reaction above the error message displayed is:



➢No error received when we run ‘CHECK’ if the operator ‘/’ in reaction code is kept as below :



CONCLUSION

❖We would like to express our sincere gratitude to the NDPCI, DAE-BRNS, who have funded us this project at NEHU, department of Physics with Prof. B. Jyrwa as Principal Investigator and Dr. S. Ganesan as PI from BARC.

❖Working on EXFOR compilation for the past two years we have learnt valuable lessons and information.

❖This project gave us an opportunity to learn and acquire a much better understanding of nuclear data physics experiments. We note that EXFORing is a challenge and requires deep technical knowledge in nuclear physics experiments though EXFORing does not have the mandate to judge the quality of data in the publication.

❖We are looking forward to learn and gain as much as possible in the future, in Phase-2 of the NDPCI Project (under proposal stage), while working with *EXFOR COMPILATION OF NUCLEAR DATA*. We also plan to participate in Phase-2 in experiments and in theory under the guidance of NDPCI (Dr. H. Naik and Dr. Suryanarayana, BARC).

THANK YOU