



## The IAEA NRDC Network MSU INP CDFE Nuclear Data Activities

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Progress Report  
to the IAEA Advisory Group Meeting (15 - 19 May 2000, Obninsk, Russia)  
on the "Network of Nuclear Reaction Data Centres"

This report contains the **short review** of the works carried out by the CDFE concern the IAEA NRDC Network activities for the about **one year** period of time from the IAEA Technical NRDC Meeting (18 - 20 May 1999, Vienna, Austria) till now and the description of the main results obtained.

1. The **new CDFE EXFOR TRANS M029** has been produced and transmitted to the IAEA NDS. The TRANS contains 2 retransmitted (M0067 and M0431) and 17 new (Annex 1) ENTRYs (M0596 - M0612) with 73 data SUBENTs.

2. The third version of **Evaluated Photonuclear Data Library EPNDL3** included (Annex 2) altogether 21 evaluated photonuclear reaction cross sections for 6 ( $^{20,22}\text{Ne}$ ,  $^{54,56}\text{Fe}$ ,  $^{58,60}\text{Ni}$ ) materials has been produced /1, 2/ in addition to 2 previously developed libraries EPNDL1 and EPNDL2 in accordance with the program of work of the IAEA Research Contract N 8839/R2 and transmitted to the IAEA NDS.

As a whole the CDFE EPNDL (EPNDL1 - EPNDL3) library includes now altogether 61 evaluated photonuclear reaction cross sections for 26 materials.

The new simple phenomenological model (SPM) developed for calculation of giant dipole resonance decay channels competition has been used /2/ for iron and nickel various photonuclear reaction cross section evaluation.

The three year Contract N 8839 has been completely finished, the Final Report has been sent to the IAEA.

3. The CDFE photonuclear data bases put upon the Web-site (<http://depni.npi.msu.ru/cdfe>) before have been upgraded significantly by adding a new data to existed data bases and software improvement:

- in addition to the data collection of the CDFE data base "**Giant Dipole Resonance Parameters**" published before /3/ as the Table "Parameters of the giant dipole resonances" **213 new entries** and **234 new reaction cross sections** have been added; the last data base version includes now altogether **1530 entries and 1080** various photonuclear reaction cross section EXFOR data sets are available now in forms of both table and graph;
- the new CDFE Web-site **Search Engine** has been produced for the data base "**Giant Dipole Resonance Parameters**" using the MySQL data base management system (DBMS) instead of former hypertext data presentation: the search for reaction target nucleus Z and A parameters, reaction designation (combination of initial and outgoing particles), GDR position energy, absolute cross section value and integrated cross section value, reference and/or year, first author name, and correspondent EXFOR SUBENT number is possible now for this data base;
- the new CDFE Web-site Search Engine is now under construction (MySQL data base

management system (DBMS)) for complete **Photonuclear Data Index** for period of time 1955 - 1998 in accordance with the Actions and Recommendations of the IAEA Advisory Group /4/: the search for reaction target nucleus Z and A parameters, reaction, incident particle energy, measured or deduced quantity, reference, year, and first author name would be possible for this data base;

- a new **charge-particle integral reaction cross sections catalogue** produced in accordance with Actions and Recommendations of the IAEA Advisory Group /5/ in co-operation with the CAJAD (Dr. F.E.Chukreev) has been put upon the CDFE Web-site using the hypertext data presentation; the first version of the Search Engine (MySQL DBMS) has been realised: the search for reaction target and product nucleus Z and A parameters, reaction designation (combination of initial and outgoing particles), initial particle energy range, and correspondent EXFOR SUBENT number is possible now for this data base.

4. The **relational nuclear spectroscopy data base NESSY** (New ENSDF Search SYstem) produced before /6/ for PC and compatible computers has been put upon the CDFE Web-site using the MySQL DBMS:

- configuration on both search conditions and output information is not limited;
- automatic formation of tables containing the search parameters can be included into the common query configuration:
  - Query\_1 (ENSDF)  $\Rightarrow$  Result\_1,
  - Query\_2 (Result\_1)  $\Rightarrow$  Result\_2,
  - and so on;
- requests are posed by means of both values and the relations between them;
- arithmetical and other operations over searched values are possible.

5. All needed /7, 8/ CDFE contribution texts and correspondent data sets for the IAEA **Handbook on Photonuclear Data** have been prepared in accordance with the program of work of the IAEA Co-ordinated Research Program "Compilation and Evaluation of Photonuclear Data for Applications".

### References

1. **V.V.Varlamov, M.E.Stepanov.** The Giant Dipole Resonance Decay Main Channels Analysis and Photoneutron and Photoproton Reaction Cross Sections Evaluation for  $^{20,22}\text{Ne}$ . MSU INP Preprint-99-40/598, Moscow, 1999.
2. **S.S.Borodina, A.V.Varlamov, V.V.Varlamov, B.S.Ishkhanov, V.I.Mokeev, S.I.Pavlov.**  $^{54,56}\text{Fe}$  and  $^{58,60}\text{Ni}$  ( $\gamma,n$ ), ( $\gamma,p$ ), ( $\gamma,np$ ), and ( $\gamma,2n$ ) Reaction Cross Sections Evaluation Using the Model of the GDR State Decay Channel Competition Phenomenological Description. MSU INP Preprint -2000-6/610, Moscow, 2000.
3. **A.V.Varlamov, V.V.Varlamov, D.S.Rudenko, M.E.Stepanov.** Atlas of Giant Dipole Resonances. Parameters and Graphs of Photonuclear Reaction Cross Sections. INDC(NDS)-394, IAEA NDS, Vienna, Austria, 1999.
4. Ed. by **V.G.Pronyaev and O.Schwerer.** Co-ordination of the Nuclear Reaction Data Centers. Report on an IAEA Advisory Group Meeting (11 - 15 May 1998, Vienna, Austria). INDC(NDS)-383, IAEA NDS, Vienna, Austria, 1998.
5. Ed. by **O.Schwerer and H.D.Lemmel.** Co-ordination of the Nuclear Reaction Data Centres. Report on an IAEA Advisory Group Meeting (3 - 7 June 1996, Brookhaven, USA), INDC(NDS)-360, IAEA NDS, 1996.
6. Ed. by **P.Oblozinsky.** Summary Report of the 2-nd Research Co-ordination Meeting on "Compilation

- and Evaluation of Photonuclear Data for Applications” (23 - 26 June 1998, Los-Alamos, USA). INDC(NDS)-384, IAEA NDS, Vienna, Austria, 1998.
7. Ed. by *P.Oblozinsky*. Summary Report of the Third Research Co-ordination Meeting on “Compilation and Evaluation of Photonuclear Data for Applications”. (25 - 29 October 1999, JAERI, Tokai, Japan). INDC(NDS)-409, IAEA NDS, Vienna, Austria, 2000.
  8. *I.N.Boboshin, V.V.Varlamov*. The New ENSDF Search System NESSY: IBM/PC Nuclear Spectroscopy Data Base. Nucl.Instr. and Meth., A369 (1996) 113.

**Annex 1. CDFE EXFOR TRANS M029 contents (new ENTRYs)**

ENTRY's Number	<i>Amount of DATA TABLEs</i>
M0596	5
M0597	12
M0598	4
M0599	16
M0600	2
M0601	4
M0602	2
M0603	4
M0604	2
M0605	3
M0606	2
M0607	4
M0608	2
M0609	3
M0610	2
M0611	4
M0612	2
<b>Total: 17</b>	<b>Total: 73</b>

**Annex 2. Evaluated Photonuclear Data Library EPNDL3 contents**

ENDF/B FORMAT	MAT	MF	MT	LINES	MOD	REACTION
<sup>20</sup> Ne	1020	1	451	108	0	
	1020	3	4	45	0	γ,n
	1020	3	28	23	0	γ,np
	1020	3	103	34	0	γ,p
<sup>22</sup> Ne	1022	1	451	87	0	
	1022	3	4	20	0	γ,n
	1022	3	103	30	0	γ,p
<sup>54</sup> Fe	2654	1	451	74	0	
	2654	3	4	12	0	γ,n
	2654	3	16	9	0	γ,2n
	2654	3	28	10	0	γ,np
	2654	3	103	14	0	γ,p
<sup>56</sup> Fe	2656	1	451	75	0	
	2656	3	4	13	0	γ,n
	2656	3	16	10	0	γ,2n
	2656	3	28	10	0	γ,np
	2656	3	103	13	0	γ,p
<sup>58</sup> Ni	2858	1	451	72	0	
	2858	3	4	13	0	γ,n
	2858	3	16	9	0	γ,2n
	2858	3	28	10	0	γ,np
	2858	3	103	14	0	γ,p
<sup>60</sup> Ni	2860	1	451	72	0	
	2860	3	4	13	0	γ,n
	2860	3	16	10	0	γ,2n
	2860	3	28	10	0	γ,np
	2860	3	103	14	0	γ,p
<b>ORIGINAL LINE COUNT</b>				<b>871</b>		
<b>FINAL LINE COUNT</b>				<b>871</b>		



## **The MSU INP CDFE Programme, Priorities and Tasks for 2000 - 2001**

The MSU INP CDFE main **tasks** for the 2000 - 2001 period of time remain the following:

- photonuclear data compilation (using EXFOR) and evaluation (using ENDF);
- Photonuclear data Index appropriate annual additions;
- relational nuclear structure data base NESSY upgrade and improvement;
- charge particle reaction data cooperation with CAJaD.

The new nuclear data processing tasks are concerned to putting upon the CDFE Web-site some new charge particle reaction data bases in accordance with CDFE - CAJaD cooperation.

The main priority for 2000 - 2001 is the CDFE Web-site improving.

The 2000 - 2001 programme of work is the following:

- Photonuclear Data Index addition for 1999 - 2000 production and adding to the appropriate Web-site data base;
- Photonuclear Data Index Search Engine switching on;
- new photonuclear data EXFOR TRANS M030 production;
- increasing the data base "Parameters of Giant Dipole Resonances" amount of entries and correspondent EXFOR data sets;
- switching on the appropriate EXFOR data sets to the CDFE - CAJaD charge particle reaction cross section catalogue;
- relational nuclear structure data base NESSY upgrade using the new ENSDF version;
- Web-site relational data base NESSY Search Engine improvement (realization of all (majority at least) NESSY's availabilities in Web);
- put upon the CDFE Web-site some new charge particle reaction data in accordance with CDFE - CAJaD cooperation.

