MSU SINP CDFE (Centre for Photonuclear Experiments Data) progress report for 2009-2010.

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Progress Report to
the IAEA Technical Meeting of "International Network of Nuclear Reaction Data Centers", 20 – 23 April 2010, Sapporo, Japan.

The report contains the short review of the main items of works carried out by the Lomonosov Moscow State University Skobeltsyn Institute of Nuclear Physics Centre for Photonuclear Experiments Data (Centr Dannykh Fotoyadernykh Eksperimentov – CDFE) concern the IAEA Nuclear Reaction Data Centres Network activities for the period of time from the IAEA Technical Meeting of Nuclear Reaction Data Centers (25 – 26 May 2009, IAEA, Vienna, Austria) till the spring of 2010 and main results obtained.

EXFOR Compilations

Three new CDFE EXFOR transes **TRANS.M050, TRANS.M051**, and **TRANS.M052** have been produced and transmitted to the IAEA NDS. The new trans **PRELIM.M053** is now in preparation.

On the whole CDFE 2009/2010 TRANSes contain (**Annex 1**) 26 retransmitted and 13 new ENTRYs with 72 new data SUBENTs.

Photonuclear Data Evaluations

In the frame of the CDFE photonuclear research program of consistent analysis and evaluation of total ((γ,xn) and (γ,sn)) and partial ((γ,n) and (γ,2n)) photonuclear reactions cross sections the new experimental-theoretical approach to evaluation of partial photoneutron reaction cross sections free from well-known shortcomings of experimental methods of photoneutron multiplicity sorting based on the modern model of photonuclear reaction based on the Fermi gas densities equations proposed before was significantly modified [1]. Specially introduced transition multiplicity functions were used for detailed analysis of reliability of experimental data on partial reactions cross sections.

In addition to those fore tin isotopes ^{112,114,116,117,118,119,120,122,124}Sn new evaluated partial photoneutron reaction cross sections were obtained for ^{63}Cu, ^{115}In, ^{169}Tm, ^{197}Au, ^{209}Bi using mew experimental-theoretical approach to such kind evaluations.

Data for tin and gold isotopes are presented to the International Conference on Nuclear Data for Science & Technology (ND2010, April 26 – 30, 2010, Jeju Island, Korea) [1, 2].

The results of the detailed systematical analysis of the (γ,xn), (γ,sn), (γ,n), (γ,2n) and (γ,f) reaction cross section data obtained by using quasimonoenergetic annihilation photon beams at Livermore (USA) and Saclay (France) for 4 actinides nuclei ^{232}Th, ^{238}U, ^{237}Np, and ^{239}Pu were used for joint evaluation of reliable data on those reactions cross sections. Data included into EXFOR library also are presented for ND2010 [3].

Upgrading of Databases

The main CDFE relational nuclear data databases put upon the CDFE Web-site (http://cdfe.sinp.msu.ru) have been upgraded – needed corrections, many additions, Search Engines improvements.

Previously developed interactive Calculator of nuclear reactions thresholds and energies has been significantly modified into advanced Calculator and Graph Engine for Atomic Nuclei Parameters and Nuclear Reactions and Radioactive Decays Features. New version is effective tool for calculation of various nuclei, reactions and decays mass and energy parameters and features.

Nuclear Structure Data Evaluations

Using powerful and flexible possibilities of the CDFE Complete Nuclear Spectroscopy Database "Relational ENSDF" and “Chart of Nucleus Shape and Size Parameters” relational databases Search Engines investigations of traditional and new magic and near magic nuclei were continued. Single-particle both proton and neutron states energies and occupation probabilities were evaluated using joint analysis of data from nucleon stripping and pick-up reactions for many of nuclei from the middle of the 1f-2p shell (mainly for ^{58,60,62,64}Ni and ^{64,66,68,70}Zn isotopes). Evaluated data were compared with calculations in the frame of dispersive optical model.

Short-term (2010/2011) Program

The main items of CDFE future short-term one-year program, main priorities and several most important new tasks in fields both photonuclear reaction and nuclear structure data are traditional and the following:

- Continuation of photonuclear data compilation using EXFOR format, new TRANSes (M053, M054, etc.) production.

- Continuation of joint analysis and evaluation of total and partial photonuclear reaction cross sections obtained using various methods in experiments with quasimonoenergetic annihilation and bremsstrahlung photons.
- Upgrading (corrections and additions) of all databases put upon the CDFE Web-site (http://cdfe.sinp.msu.ru).

References

1. Boris Ishkhanov, Vadim Orlin, and Vladimir Varlamov. THE NEW APPROACH TO EVALUATION OF PARTIAL PHOTONEUTRON REACTIONS (γ,nX) AND (γ,2nX) CROSS SECTIONS. ND2010, Abstract-1055 accepted.
2. Boris Ishkhanov, Vadim Orlin, Sergei Troschiev, and V.V.Varlamov. NEW DATA FOR PARTIAL PHOTONEUTRON REACTIONS 197Au(g,nX) AND 197Au(g,2nX) CROSS SECTIONS. ND2010, Abstract-1053 accepted.
3. Nikolai Peskov, and Vladimir Varlamov. NEW EVALUATED DATA FOR TOTAL AND PARTIAL PHOTONEUTRON AND PHOTOFISSION REACTIONS CROSS SECTIONS FOR ACTINIDES ^{232}Th, ^{238}U, ^{237}Np AND ^{239}Pu. Abstract-1559 accepted.

Annex 1.

The contents of new 2009/2010 CDFE's EXFOR transes
(**new** and *old corrected* ENTRYs)

TRANS.M050		**TRANS.M051**		**TRANS.M052**	
ENTRY N	Amount of SUBENTs	ENTRY N	Amount of SUBENTs	ENTRY N	Amount of SUBENTs
M0626	*5*	*M0180*	1	*L0032*	22
M0650	*5*	*M0182*	4	*L0091*	5
M0772	**3**	*M0338*	3	*M0231*	3
M0773	**2**	*M0380*	7	*M0404*	4
M0774	**2**	*M0411*	2	*M0549*	5
M0775	**2**	*M0560*	1	*M0666*	1
M0776	**2**	*M0588*	2	*M0690*	2
M0777	**2**	*M0635*	34	*M0711*	5
M0778	**6**	*M0688*	5	*M0759*	3
M0779	**10**	*M0756*	1	*M0763*	1
		M0775	2	**M0780**	**4**
				M0781	**29**
				M0782	**3**
				M0785	**3**
				M0786	**5**
Total new: 8 *Total corr.: 5*	**Total new: 29** *Total corr.: 17*	**Total new: 0** *Total corr.: 11*	**Total new: 0** *Total corr.: 62*	**Total new: 5** *Total corr.: 10*	**Total new: 43** *Total corr.: 51*
Sum of new ENTRYs: 13 **Sum of new SUBENTs: 72** *Sum of retransmitted ENTRYs: 26* *Sum of retransmitted SUBENTs: 140*					