

# Ukrainian Nuclear Data Centre (UKRNDC)

Progress Report to the  
IAEA Technical Meeting on the Network of Nuclear Reaction Data Centres,  
8 - 10 October 2007, IAEA, Vienna, Austria

Summary of nuclear data activity by staff of the UKRNDC  
October 2006 –September 2007

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## Introduction

Ukrainian Nuclear Data Centre (UKRNDC) is subdivision within the Neutron Physics Department at the Institute for Nuclear Research of the National Academy of Sciences of Ukraine. UKRNDC has 5 permanent researchers. During year under review three members of the staff were involved in an implementation of the STCU contract UZ-25 “Creation of modern manufacturing technologies and certification methods for radioisotope production needed in science, medicine and industrial applications in Ukraine and Uzbekistan Republic”.

## Compilation

We continue collection and compilation of experimental neutron, charged particle and photonuclear data published by Ukrainian researchers. Number of the EXFOR’s entries sent to NDS IAEA by UKRNDC are:

- for neutron data –3 entries;
- for charged particle data –41 entries;
- for photonuclear data –7 entries.

The list is presented in Table.

## Collaboration

We continue our collaboration with the Physics Department of the Taras Shevchenko National University of Kyiv.

- The teaching courses “*Nuclear Data for Science and Technology*” (36 hours per year) and “*Modern computer codes for nuclear data processing*” (36 hours per year) are lectured in 2006-2007 for graduate course students of NPD KNU. These courses include the following items: ENDF/B libraries, EXROR system, ENSDF library, the use of the PREPRO code in work with the ENDF libraries, the introduction to NJOY99 code system, the Network of Nuclear Reaction Data Centers and the use of the on-line services.
- The teaching courses “*Neutron Physics at the Kyiv Research Reactor*” (36 hours per year) are lectured in 2006-2007 for fourth-year students of NPD KNU.

Table. EXFOR's entries sent to NDS IAEA by UKRNDC.

#	EXFOR's entry	Reference	Author
<i>Neutron data</i>			
1	32211	C,2004SANTA,1,(1),762,2004	S.A. Kravchenko, M.F. Vlasov, O.O.Gritzay
2	32215	J,JAI,3,(8),(JAI13424),2006	O.Gritzay, V.Koloty, N.Klimova, O.Kalchenko, M.Gnidak, P.Vorona
3	32216	C,2007NICE,(#228),2007	O. Gritzay , V. Koloty, N. Klimova, O.Kalchenko, M. Gnidak and P. Vorona
<i>Charged particle data</i>			
1	D5007	J,IZV,68,(2),238,2004 J,BAS,68,266,2004	E.P.Kadkin,S.N.Kondratyev,S.E.Omelchuk, L.S.Saltikov, V.D.Sklyarenko,L.I.Slusarenko, N.P.Yurkuts
2	D5008	J,YF,67,899,2004	V.A.Zheltonozhcky, V.M.Mazur, Z.M.Bigan
3	D5009	J,IZV,68,(2),188,2004) (J,BAS,68,210,2004	A.N.Vodin,A.S.Kachan,L.P.Korda, V.M.Mishchenko,R.P.Slabospitsky,I.V.Ushakov, G.K.Khomyakov
4	D5010	J,IZV,68,(2),195,2004 J,BAS,68,218,2004	A.N.Vodin,A.S.Kachan,L.P.Korda, V.M.Mishchenko,R.P.Slabospitsky,I.V.Ushakov, G.K.Khomyakov
5	D5011	J,IZV,68,(11),1577,2004 J,BAS,68,1761,2004	A.N.Vodin,A.S.Kachan,L.P.Korda, O.A.Lepeshkina,R.P.Slabospitsky, S.A.Trotsenko,I.V.Ushakov
6	D5012	J,IZV,65,(5),695,2001 J,BAS,65,746,2001	A.N.Vodin,A.S.Kachan,V.M.Mishchenko
7	D5013	J,IZV,69,(5),742,2005 J,BAS,69,838,2005	O.K.Gorpinich,O.M.Povoroznyk, A.A.Jachmenjov
8	D5014	J,IZV,63,(5),1027,1999 J,BAS,63,821,1999	A.S.Kachan, A.N.Vodin, V.M.Mishchenko, R.P.Slabospitsky
9	D5015	J,IZV,69,(5),745,2005 J,BAS,69,841,2005	O.K.Gorpinich,O.M.Povoroznyk, A.A.Jachmenjov
10	D5016	J,IZV,70,(5),751,2006	A.S.Kachan,I.S.Kovtunencko,I.V.Kurguz, V.M.Mishchenko,R.P.Slabospitsky
11	D5017	J,IZV,69,(11),1613,2005 J,BAS,69,1802,2005	A.N.Vodin,L.P.Korda,V.M.Mishchenko, O.A.Lepeshkina, S.A.Trotsenko,I.V.Ushakov
12	D5018	J,IZV,69,(11),1619,2005 J,BAS,69,1809,2005	B.A. Nemashkalo,K.B. Shebeko, S.N.Utenkov
13	D5019	J,IZV,65,(5),692,2001 J,BAS,65,742,2001	O.K.Gorpinich,Vit.M.Pirnak,O.M.Povoroznyk Yu.S.Roznyuk, B.G.Struzhko
14	D5020	J,IZV,66,(5),743,2002 J,BAS,66,818,2002	O.K.Gorpinich, O.M.Povoroznyk, Yu.N.Pavlenko, Yu.S.Roznyuk, B.G.Struzhko
15	D5021	J,IZV,67,(11),1556,2003) (J,BAS,67,1717,2003	B.A.Nemashkalo,S.N.Utenkov,S.S.Ratkevich, I.D.Fedorets
16	D5022	J,IZV,67,(11),1561,2003 J,BAS,67,1723,2003	B.A.Nemashkalo,K.v.Shebeko,S.S.Ratkevich, I.D.Fedorets
17	D5023	J,VAT/I,44,(5),31,2004	O.K.Gorpinich,O.M.Povoroznyk, A.A.Jachmenjov
18	D5024	J,UFZ,50,(4),327,2005	O.K.Gorpinich, O.M.Povoroznyk

19	<b>D5025</b>	J,UFZ,49,(1),16,2004	O.K.Gorpinich,O.M.Povoroznyk, O.O.Yachmenov
20	<b>D5026</b>	J,NP/A,700,(1-2),25,2002	A.T.Rudchik,Val.M.Pirnak,A.Budzanowski, A.Szczurek,V.K.Chernievsky,L.Gowacka, S.Kliczewski,E.I.Koshchy,A.V.Mokhnach, R.Siudak,I.Skwirczynska,J.Turkiewicz, V.A.Ziman
21	<b>D5027</b>	J,NP/A,602,211,1996	A.T.Rudchik,A.Budzanowski,E.I.Koshchy, L.Glowacka,Yu.G.Mashkarov,M.Makowska- Rzeszutko,Val.M.Pirnak,R.Siudak,A.Szczurek, J.Turkiewicz,V.V.Uleshchenko,V.A.Ziman
22	<b>D5028</b>	J,NP/A,639,599,1998	S.B.Sakuta,Yu.A.Glukhov,A.T.Rudchik, Val.M.Pirnak,A.Budzanowski,S.Kliczewski, R.Siudak,I.Skwirczynska,A.Szczurek
23	<b>D5029</b>	J,ZNJD,,(2),16,2006	Yu.Pavlenko,O.K.Gorpinich,V.N.Dobrikov, N.L.Doroshko,V.O.Kiva,I.N.Kolomiets, V.I.Medvedev,Val.M.Pirnak
24	<b>D5030</b>	J,IZV,67,(11),1583,2003 J,BAS,67,1743,2003	O.K.Gorpinich, O.M.Povoroznyk, Yu.S.Roznyuk, B.G.Struzhko, A.A.Yachmenev
25	<b>D5031</b>	J,IZV,63,(5),1021,1999 J,BAS,63,816,1999	A.N.Vodin,A.S.Kachan,V.M.Mishchenko
26	<b>D5032</b>	J,PR/C,15,(2),579,1977	J.Keinonen, M.Riihonen, A.Anttila
27	<b>D5033</b>	J,NP/A,313,251,1979	M.Riihonen, J.Keinonen, A.Anttila
28	<b>D5034</b>	J,NP/A,318,111,1979	J.J.A.Smit, M.A.Meyer, J.P.L.Reinecke, D.Reitmann
29	<b>D5035</b>	J,NP/A,341,345,1980	J.Keinonen, S.Brandenburg
30	<b>D5036</b>	J,IZV,66,(1),40,2002 J,BAS,66,40,2002	A.N.Vodin, A.S.Kachan, V.M.Mishchenko
31	<b>D5037</b>	J,UFZ,45,(7),795,2000	Grantsev V.I., Dryapachenko I.P., Pirnak Vit.M., Povoroznyk O.M., Pshedzjal A.P., Roznyuk Yu.S., Rudenko B.A., Struzhko B.G.
32	<b>D5038</b>	J,UFZ,48,(10),1035,2003	GorpinichO.K.,PovoroznykO.M.,YachmejevO.
33	<b>D5039</b>	J,VAT/I,40,(2),33,2002	A.S.Kachan, A.N.Vodin, V.Yu.Korda, V.M.Mishchenko, R.P.Slabospitsky
34	<b>D5040</b>	J,VAT/F,45,(6),40,2005 J,IZV,70,(11),1623,2006	S.N.Utenkov, K.V.Shebeko
35	<b>D5041</b>	J,VAT/I,40,(2),30,2002	A.N.Vodin, I.V.Ushakov, A.S.Kachan, I.P.Korda, V.M.Mischenko, B.A.Nemashkalo
36	<b>D5042</b>	J,VAT/I,44,(5),39,2004	A.S.Kachan, A.N.Vodin, I.V.Kurguz, O.A.Lepyoshkina, S.A.Trotsenko, I.V.Ushakov
37	<b>D5044</b>	J,UFZ,45,(3),270,2000	Gorpinich O.K., Grantzev V.I., Dryapachenko I.P., Pirnak Vit.M., Povoroznyk O.M., Pshedzjal A.P., Roznyuk Yu.S., Struzhko B.G.
38	<b>D5046</b>	J,NP/A,785,293,2007	A.A. Rudchik,A.T. Rudchik,S.Kliczewski, E.I. Koshchyc, O.A. Ponkratenko, K.W. Kemper,K. Ruseke,A.Budzanowski, J. Choinski, B. Czech, T. Czosnyka, V.D. Chesnokova, L. Glowacka,E. Kozik, V.M. Kyryanchuk,S.Yu. Mezhevych, A.V. Mokhnach,O.A. Momotyuk, I. Skwirczynska,R. Siudak, A.Szczurek

39	<b>D5047</b>	J,UFZ,45,(10),1154,2000 J,BAS,64,370,2000	B.Struzhko
40	<b>D5048</b>	C,2007NICE,(#279),2007	Ye.Skakun, S.M.Qaim
41	<b>D5049</b>	C,2006CERN,1,204,2006	Ye. Skakun, T. Rauscher.
<b>Photonuclear data</b>			
1	<b>G4005</b>	J,ZNJD,8,(2),46,2002	O.A.Bezsheyko, V.A.Zheltonozhsky, I.M.Kadenko, N.A.Strilchuk
2	<b>G4006</b>	J,YF,62,(5),941,1999 J,PAN,62,880,1999	I.N.Vishnevsky,V.A.Zheltonozhsky,V.M.Mazur, M.V.Hoshovsky
3	<b>G4007</b>	J,YF,54,(3),609,1991	I.Z.Beseda,A.I.Guty,Ya.E.Kostyu,A.P.Osipenko, N.T.Sabolchy, I.V.Khimich, I.A.Shabalina
4	<b>G4008</b>	J,UFZ,46,(5-6),529,2001	Mazur V.M., Bigan Z.M.
5	<b>G4009</b>	J,UFZ,50,(7),649,2005	Hoshovsky M.V., Mazur V.M., Bigan Z.M., Lyamayev V.I., Marynets T.Yo.
6	<b>G4010</b>	J,UFZ,50,(7),649,2005	Bokhinyuk V.S., Guthy A.I., Parlag A.M., Sabolchy M.T., Sokolyuk I.V., Khimich I.V.
7	<b>G4011</b>	J,UZHV,19,90,2006	O.O.Parlag

### Customer Services

- During 2006-2007 the data for users requests were prepared and adapted (from ENDF, ENSDF and EXFOR libraries) for our institute researchers and for ones from other institutes. The organizations, whose requests on nuclear data have arrived and were executed in the accounting period:
  1. Center of Environmental Problems INR of NASU.
  2. Department of Nuclear Physics of Kyiv National University.
  3. Department of Nuclear Physics of the Institute for Nuclear Research (INR) of NASU.
  4. Department of Physics of Biological Systems of the Institute of Physics of NASU.
  5. Department of the Theory of Nuclear Reactions INR of NASU.
  6. Department of Nuclear Reactions INR of NASU.
  7. Uzhgorod Institute of Nuclear Physics of NASU.
- The UKRNDC site is operating. Ukrainian customers, especially students and those physicists, who wish to prepare the pointwise and multigroup cross sections self-dependently, but do not have a good experience in it, use this site very often. Today we are refreshing the site. Address of the UKRNDC site: <http://ukrnc.kinr.kiev.ua>.

### Calculation

The ACE-format libraries for the isotopes needed for calculations of the maximum specific activity of the irradiated products at the INR WWR-M reactor, namely,  $^{50, 52, 53, 54}\text{Cr}$ ,  $^{54, 56, 57, 58}\text{Fe}$ ,  $^{92, 94, 95, 96, 97, 98, 100}\text{Mo}$ ,  $^{58, 59}\text{Co}$ ,  $^{89}\text{Y}$ ,  $^{96, 98, 99, 100, 101, 102, 103, 104, 105, 106}\text{Ru}$ ,  $^{107, 109, 111}\text{Ag}$ ,  $^{106, 108, 110, 111, 113, 114, 115\text{m}, 116}\text{Cd}$ ,  $^{112, 113, 114, 115, 116, 114, 117, 118, 119, 120, 122, 123, 124, 125, 126}\text{Sn}$ ,  $^{120, 122, 123, 124, 125, 126, 128, 130, 132}\text{Te}$ ,  $^{133, 134, 135, 136, 137}\text{Cs}$ ,  $^{136, 138, 140, 141, 142, 143, 144}\text{Ce}$ ,  $^{141, 142, 143}\text{Pr}$ ,  $^{142, 143, 144, 145, 146, 147, 148, 150}\text{Nd}$ ,  $^{144, 147, 148, 149, 150, 151, 152, 153, 154}\text{Sm}$ ,  $^{151, 152\text{g}, 153, 154, 155}\text{Eu}$ ,

<sup>152, 153, 154, 155, 156, 157, 158, 160</sup>Gd, <sup>159</sup>Tb, <sup>175, 176</sup>Lu, <sup>181</sup>Ta, <sup>180, 182, 183, 184, 186</sup>W, <sup>185, 187</sup>Re, <sup>191, 193</sup>Ir, <sup>84, 86, 87, 88, 89, 90</sup>Sr, <sup>197</sup>Au, <sup>196, 198, 199, 200, 201, 202, 204</sup>Hg, are in preparation. The input data are taken from the nuclear data libraries: BROND-2.2, ENDF/B-VI (rel. 8), ENDF/B-VII, JEFF-3.1, JENDL-3.3, CENDL-2. Calculations are done by NJOY99.81 code at the computer ESCALA S120 with RISC/6000 processor under AIX operating system.

### **Visits and Conferences**

- O. Gritzay and O. Kalchenko took part in the International conference on Nuclear Data for Science and Technology” (ND2007), which was held in Nice, France from April 22 to April 27, 2007.
- N. Klimova took part in the First French-Ukrainian Summer School of Particle Physics, which was held in Mukachevo in the Carpathian region of Ukraine from July 9th to July 14th, 2007.