

Ukrainian Nuclear Data Centre: Progress Report for period 2019-2021
Summary of Nuclear Data Activity by Staff of the Ukrainian Nuclear Data Centre
April 2019 – April 2021

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Ukrainian Nuclear Data Centre (UkrNDC) is subdivision within the Neutron Physics Laboratory at the Institute for Nuclear Research of the National Academy of Sciences of Ukraine. UkrNDC has two permanent researchers.

Compilation

We continue collection and compilation of experimental neutron, charged particle and photonuclear data. Number of the new/renew EXFOR's entries sent to the NDS IAEA by UkrNDC is the following:

- for neutron data – 1 new entry (32249) and 9 updated (neutron spectra were added) entries (32212, 32214÷32217, 32221, 32240, 32243, 32245);
- for charged particle data – 13 new entries (D5185, D5186, D5106, D5107, D5174, D5176÷D5180, D5182÷D5184) and 1 updated entry (D5133);
- for photonuclear data – 16 new entries (G4071÷G4078, G4080, G4081, G4083÷G4088) and 1 updated entry (G4060).

We realize review of compilation scope in home journals:

- Nuclear Physics and Atomic Energy;
- Ukrainian Journal of Physics;
- Problems of Atomic Science and Technology, Series Nuclear Physics Investigations;
- East European Journal of Physics;

Collaboration

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

- The teaching course “*Nuclear Data for Science and Technology and modern computer codes for nuclear data processing*” (38 hours) has been lectured in 2019-2020 for the fifth-course students of the NPD KNU. This course includes the following items: ENDF/B libraries, EXROR system, ENSDF library, the use of the PREPRO code in work with the ENDF/B libraries, the introduction to NJOY code system, the Network of Nuclear Reaction Data Centers and the use of the on-line services.

We continue our activity within the framework of educational and scientific program of the Institute for Nuclear Research of the National Academy of Sciences of Ukraine on the preparation of a doctor of philosophy in specialty 01.04.16 (physics of the nucleus, elementary particles and high energies).

- The teaching course “Experimental methods of nuclear power engineering” (26 hours) was prepared and lectured in April-May 2019, 2021 for post-graduated students in the 2nd year of study.
- The teaching course “Modern codes and nuclear data” (26 hours) was prepared and lectured in September-October 2020 for post-graduated students in the 2nd year of study.

Customer Services

- During 2019-2021 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 UkrNDC site is operating. Ukrainian customers, especially students and those physicists, who wish to prepare the point-wise and multi-group cross sections self-dependently, but do not have a good experience in it, use this site very often. Address of the UkrNDC site: <http://ukrndc.kinr.kiev.ua>.
- Several computer codes from NEA DATA BANK were requested by KINR users and one of them PENELOPE-18 was transmitted to end user for Monte-Carlo calculations including university students having practice in our Institute. Others are in process of receiving by KINR subdivisions. We are

very thankful to NEA DATA BANK colleagues for reviving this activity and for their efforts in codes sending, especially in coronavirus situation.

Experimental and Computational Activity

Determination of the total neutron cross section for natural hafnium in the energy range 2–145keV has been completed.

O.Gritzay, A. Grymalo, V. Pshenychnyi, V. Venedyktov, V. Shachov
Determination of the total neutron cross section for natural hafnium in the energy range 2–145keV // Nucl. Phys A 996 (2020) 121693.

A new interference neutron filter with an average energy of 1.65 keV was simulated, based on the latest version of the evaluated nuclear data library ENDF/B-VIII.0. The main components of the filter: scandium, nickel-60, iron-54, and selenium-80. We expect the following characteristics of this new filter: the average energy – 1.64 keV, the main line FWHM – 0.7 keV, purity of the main line – 97%, the neutron flux density – $1.0 \cdot 10^6 \text{ n} \cdot \text{s}^{-1} \cdot \text{cm}^{-2}$. Experimental verification of the new filter parameters is planned during the next campaign of the WWR-M reactor.

Determination of the total neutron cross section for chromium-52 on the filtered neutron beam with energy 59 keV is in process.

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