

Korea Nuclear Data Center (KNDC)

Progress Report for period 2021-2022

Technical Meeting on the International Network of Nuclear Reaction Data Centers (NRDC 2022)
14 - 17 June, 2022

Korea Atomic Energy Research Institute
Daejeon, Korea

Web: <http://atom.kaeri.re.kr/>

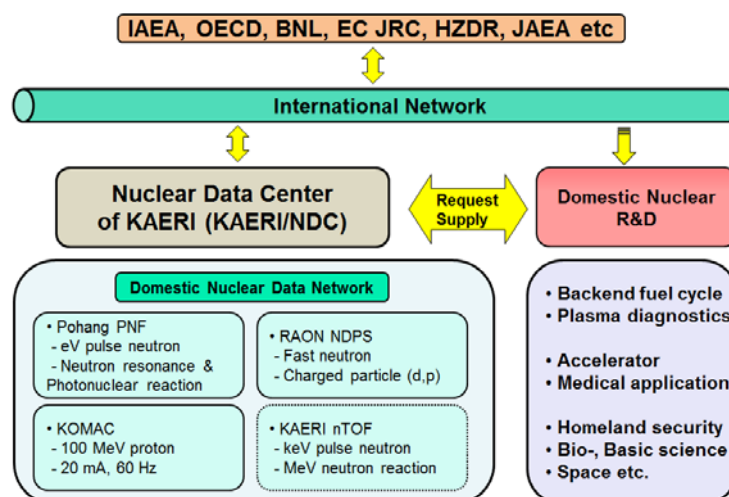
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1. General

Korea Nuclear Data Center (KNDC, formerly ‘Nuclear Data Evaluation Lab.’) was established in 1997 to start research on nuclear data in Korea and joined the International Network of Nuclear Reaction Data Centers (NRDC) in 2000. KNDC at Korea Atomic Energy Research Institute (KAERI) performs the following main tasks:

- Evaluation and method development for nuclear reaction data
- Establishment of processing and validation system of nuclear reaction/covariance data
- Measurement of nuclear reaction data and establishment of measurement facility
- Production and validation of atomic/molecular collision data

The mission of our center includes disseminating the outcomes of cooperation with international networks as well as promoting nuclear data research activities and supporting nuclear/radiation R&Ds in Korea. KNDC is also coordinating the measurement activities using domestic accelerators for producing various nuclear reaction data.



KNDC continues to cooperate with the international nuclear data network as follows:

- Participating in IAEA CRP, TM, and CM on nuclear data evaluation, nuclear data processing and validation, atomic/molecular data network, etc.
- Collecting nuclear reaction measurement data in Korea for EXFOR compilation under the guidance of IAEA/NDS
- Participating in the JEFF and WPEC subgroups of OECD/NEA
- Conducting joint research on evaluation, measurement, and validation of nuclear data with foreign research institutes

As of 2022, KNDC consists of 9 regular staffs, a post-retirement researcher, and a Ph.D. student. The latest staff changes include:

- Choong-Sup GIL retired in May 2022 and joined as a post-retirement researcher in June 2022.
- Jounghwa LEE, who was a post-doctor, is scheduled to join as a regular staff in July 2022.

They are working in the following fields:

- Nuclear data evaluation: 2 regular staffs
- Nuclear data measurement: 3 regular staffs
- Nuclear data processing/validation/application: 2 regular staffs, a post-retirement researcher, a Ph.D. student
- Atomic/molecular data production: 2 regular staffs

2. EXFOR Activity

The compilation of nuclear reaction data in Korea continues to be carried out under the guidance of IAEA/NDS. Since the last meeting in 2021, 10 new entries were registered in the EXFOR DB and 5 entries were transmitted after compilation. (See Table 1.)

Table 1. Compilation statistics of KNDC

No.	TRANS	ENTRY	SUBJECT	STATUS
1	3201	30847	Neutron	EXFOR
2	3200	30848	Neutron	EXFOR
3	G047	G3136	Gamma	EXFOR

4	G047	G3137	Gamma	EXFOR
5	G048	G3138	Gamma	EXFOR
6	3206	30849	Neutron	EXFOR
7	3206	30850	Neutron	EXFOR
8	D135	D7028	Alpha	EXFOR
9	D135	D7029	Alpha	EXFOR
10	D135	D7030	Proton	EXFOR
11		D7031	Proton	Compiled
12		D7032	Proton	Compiled
13		D7033	Proton	Compiled
14		D7034	Proton	Compiled
15		D7035	Proton	Compiled

- **Checking Code**

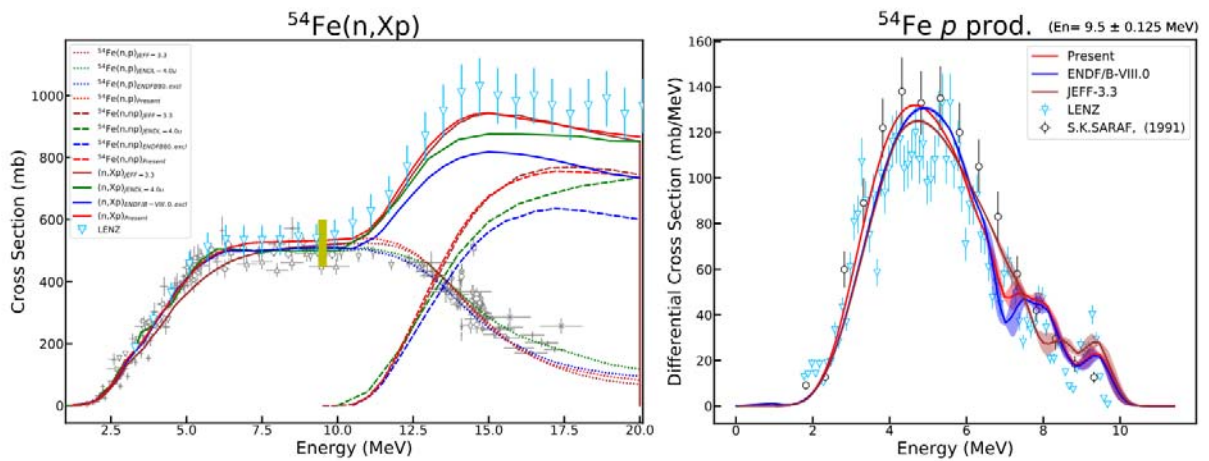
The draft was checked through a tool of JCPRG. (<http://www.jcprg.org/exfor/tool/>)

3. Nuclear Data Activities

3.1 Evaluation

A research on improving angular distributions and energy spectra of neutron-induced charged particle is continuing through the International Nuclear Energy Research Initiative (INERI) project with Los Alamos National Laboratory (LANL). A collaborative work is underway to analyze the experimental data for angular distributions and spectra of (n,p) and (n,a) on several structural materials such as Fe, Ni and Zn isotopes and evaluate/update the accompanying data.

As one of preliminary results, the figures below show the newly evaluated (n,Xp) cross section (left) and proton spectra induced by 9.5 MeV neutron (right) on ⁵⁴Fe, which are compared to newly measured data using the Low Energy Neutron-induced Charged-particle (Z) Chamber (LENZ) instrument at Los Alamos Neutron Science Center and available libraries, JEFF-3.3, JENDL-4.0u and ENDF/B-VIII.0.

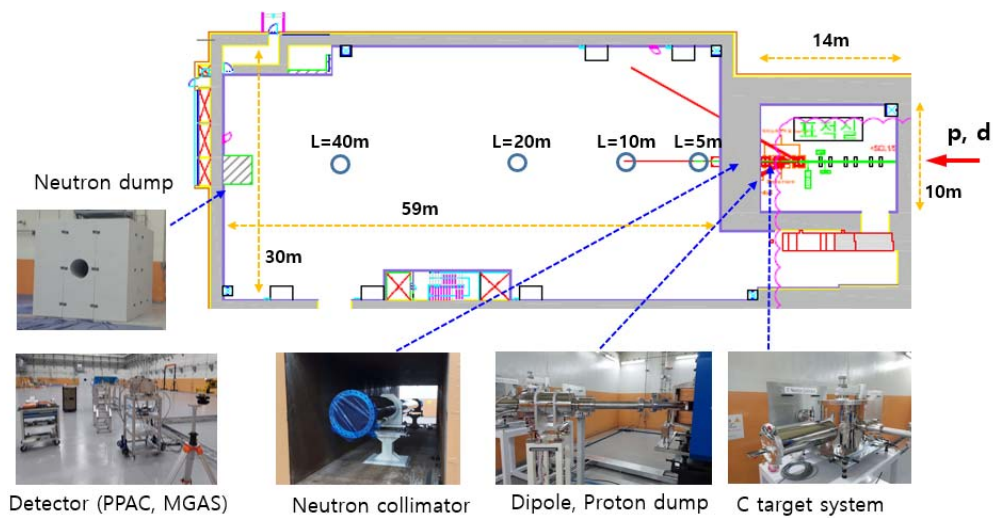


A new project on the “Development of Thermal Neutron Scattering Data Production Technology for Future Advanced Nuclear Reactors” was launched in April 2022. The purpose of this project is to establish an MD-based TSL data production system and to produce, validate, and support TSL data of coolant/moderator materials for future advanced nuclear reactor development in Korea.

3.2 Measurement

Nuclear Data Production System (NDPS) is being constructed for nuclear science and applications at RAON (Rare Isotope Accelerator complex for ON-line experiments), IBS in Korea. The components of the NDPS facility (beam line, vacuum system, pulse beam generator, neutron target system, collimator, beam dumps, etc.) were designed, manufactured, and installed in cooperation with domestic research groups (IBS, KAERI, SKKU, UNIST). NDPS will provide white neutrons by bombarding a thick graphite target with 49 MeV/u deuterons and mono-energetic neutrons by bombarding thin lithium targets with 20~83 MeV proton beams.





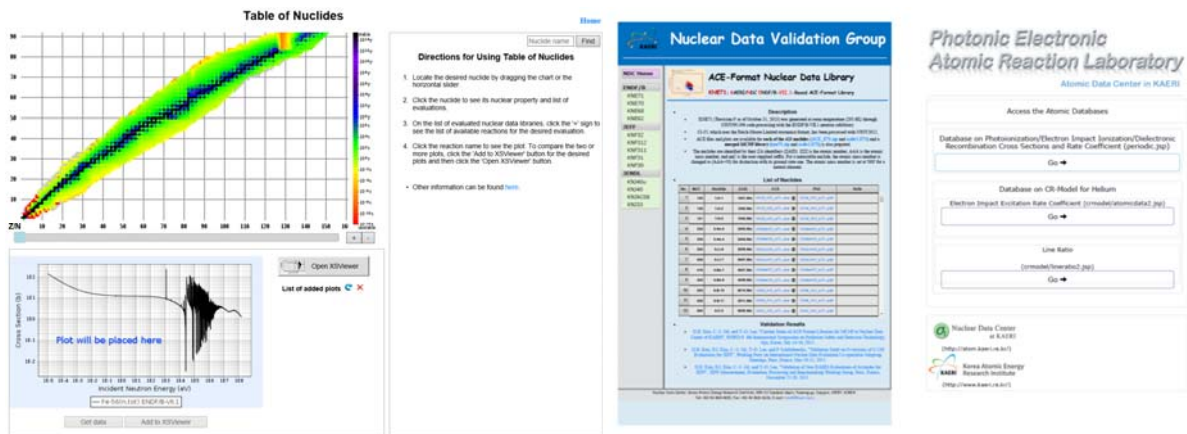
3.3 Cooperation

The 11th Korea-Japan Joint Summer School on Accelerator and Beam Science, Nuclear Data, Radiation Engineering and Reactor Physics will be held in Gyeongju, Korea from August 1 to 4, 2022. This event is organized by KOMAC of KAERI and supported by KNDC. The purpose is to introduce the latest research activities on accelerators, reactor physics, nuclear data, etc. in Korea and Japan to graduate students and to inspire their research motivation.

3.4 Web Service

KNDC provides the following three main web services. These websites are constantly being updated.

- Nuclear Data Chart (<http://atom.kaeri.re.kr/nuchart/>): nuclide information, nuclear reaction data, cross section data plot and comparison
- Application Library (<http://atom.kaeri.re.kr/NDVG/>): processed nuclear data library for Monte Carlo (ACE) and deterministic (MATXS) neutron transport codes, processed covariance data (COVFIL), fission product yield and decay data for SCALE
- Atomic Data (<http://pearl.kaeri.re.kr/pearl/>): atomic database including photoionization cross section, electron impact ionization (EII) rate coefficient, and dielectronic recombination (DR) rate coefficient



3.5 Support for Nuclear/Radiation R&Ds

KNDC supports domestic and foreign nuclear/radiation R&Ds by providing nuclear data related information, how to process nuclear data, working libraries for application, etc. The main support details for 2021 were as follows:

- NJOY-processed multigroup KERMA data of Si isotopes for VHTR analysis (KAERI)
- Advisory on covariance data (company)
- ACE-format libraries (with 18 temperatures) based on ENDF/B-VIII.0 for research reactor analysis (KAERI)
- ACE-format TSL library (with 18 temperatures) of ZrH, CH₂, and BeO for micro-reactor analysis (KAERI)