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P01

Recommissioning of the ELIGANT-TN Thermal Neutron Array and Its Upgrade for (α,n) and (p,n) Cross-Section Measurements

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The ELIGANT Thermal Neutron (ELIGANT-TN) detector array at ELI-NP/IFIN-HH was originally developed for photo-induced reaction cross-section measurements [1]. Over the past several years, significant efforts have been devoted to adapting, commissioning, and operating the setup for (α,n) and (p,n) reaction cross-section measurements at the IFIN-HH accelerator facilities [2,3].

In 2026, the setup was successfully recommissioned for cross-section measurements at the 3 MV Tandetron and 9 MV Tandem accelerators of IFIN-HH. Several experimental campaigns were conducted, including measurements of the ^{51}V(α,n), ^{55}Mn(α,n), ^{22}Na(α,n), and ^{14}N(α,n) reactions, which are relevant to nuclear astrophysics and applied nuclear physics.

The current array consists of 28 ^{3}He proportional counters arranged in three concentric rings within a polyethylene moderator, providing a neutron detection efficiency of approximately 38%. Following the successful operation of the system and the high-quality data obtained, an upgraded detector array is being developed. The new design will employ 74 ^{3}He counters arranged in four rings and is expected to achieve a neutron detection efficiency exceeding 50% with an optimized and nearly flat energy response. The upgraded ELIGANT-TN array will provide an advanced tool for high-precision (α,n) and (p,n) cross-section measurements.

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P02

MACS at 30keV and 25meV activation measurements at CNA HiSPANoS

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Accurate neutron capture cross section data are essential in the understanding and description of stellar nucleosynthesis, reactor design, radiation transport calculations, and many other nuclear applications. However, significant discrepancies still exist between different experimental datasets, partly because high-precision time-of-flight measurements are experimentally demanding and require very complex facilities. In some cases, integral measurements based on neutron activation provide a simpler experimental alternative. Many isotopes remain activated after a neutron capture, and through gamma spectroscopy the integral capture cross section of said isotopes can be obtained. Although these measurements do not provide energy-dependent cross sections, they constitute valuable benchmarks for the validation of evaluated nuclear data libraries and can help resolve discrepancies between different evaluations

At CNA HiSPANoS epithermal neutron activation measurements were performed for different isotopes exhibiting discrepancies among current nuclear data libraries.
A quasi-Maxwellian neutron spectrum, produced via the ^{7}Li(p,n) reaction at E_p=1912keV, was used to successfully determine the Maxwellian-averaged cross section (MACS) at 30 keV [1,2].

Now, a series of measurements of MACS at 30keV for different isotopes, such as ^{59}Co, ^{63}Cu or ^{186}W, is currently being developed based on the previous work. In addition, thermal cross sections (MACS at 25meV) will also be measured using the recently installed thermal neutron generator. The integral measurements at two different energy ranges will help to identify possible systematic errors and better resolve the discrepancies in the resonance region between the current data libraries.
First experimental results will be presented, along with the main characteristics of the activation facility. Finally, the cyclic measurement station, currently under development to expand the capabilities of HiSPANoS for measuring isotopes with much shorter half-lives (~ s) will be described. The isotope ^{109}Ag is a clear example where cyclic measurements are needed, since the half life of ^{110}Ag is 25s. With the installation of a linear stager and a HPGe this isotope can be measured at our facility.

[1] P. Pérez-Maroto, et al, Phys. Lett. B **862** 139360 (2025).
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P03

PARADIGM Fast and Intermediate Spectra Critical Experiments Reaction Rates

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The PARallel Approach of Differential and InteGral Measurements (PARADIGM) project aims to reduce ^{239}Pu nuclear data uncertainties between 1 keV and 600 keV by providing new measurement data in the intermediate neutron energy region [1]. Integral experiments were performed in May 2025 where two critical configurations were assembled at the National Criticality Experiments Research Center (NCERC) [2] using the Zero Power Physics Reactor (ZPPR) Plutonium Aluminium No Nickle (PANN) plates [3] as fuel; the ZPPR-PANN plates are delta-phase weapons grade Pu, clad in stainless steel. Materials were interposed between fuel plates in each design to shape the spectrum for specific Pu neutron energy ranges and copper reflector was used to maintain a criticality. One assembly used alumina to cause the spectrum to optimally increase the number of neutrons at energies between 30 keV and 600 keV. The second assembly used a combination of alumina and graphite to further moderate neutrons to energies of 1 keV to 30 keV. Both configurations were built on the COMET critical lift machine [2].

Once critical configurations were achieved, neutron activation monitors, in the form of thin discs, were inserted into the system. These monitors were used to measure the neutron spectrum of both configurations. The activation foils were selected following recommendations from ASTM E720, *Standard Guide for Selection and Use of Neutron Sensors for Determining Neutron Spectra Employed in Radiation-Hardness Testing of Electronics* [4]; twelve reactions were analyzed. The activation monitors were positioned near the center of the critical assembly. Both configurations contained a high-assay low-enriched uranium fission monitor and a depleted uranium fission monitor. Reaction rates were calculated by measuring the gamma emissions of the activation products using high purity germanium detectors. Isotopic and decay data necessary to calculate the reaction rates, including their uncertainties, were obtained from the International Reactor Dosimetry and Fusion File II [5]. Reaction rates and their associated uncertainties are presented in the accompanying poster and are planned to be used in sensitivity analyses and cross section adjustments.

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P04

Critical Benchmark Validation of the Core Physics Multi-group Cross-Section Library TPEX

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Core physics multigroup cross-section libraries provide essential cross-section and burnup data for reactor neutron physics calculations, serving as a fundamental prerequisite for reactor physics analysis. The China Nuclear Data Center has developed the TPEX multigroup cross-section library for pressurized water reactors (PWRs) based on the Chinese Evaluated Nuclear Data Library CENDL-3.2. A systematic critical benchmark validation of the newly developed TPEX library has been performed. To verify its applicability and accuracy, the validation has been conducted against 131 critical benchmark experiments from the International Criticality Safety Benchmark Evaluation Project (ICSBEP 2006) and the WIMS-D library update project. The calculated effective multiplication factors k_{eff} are compared with the experimental values, results from equivalent multigroup libraries, and reference solutions from Monte Carlo code. The results indicate that the absolute average deviations between the calculated k_{eff} values using the TPEX library and the experimental measurements are 280 pcm for the uranium solution experiments, 410 pcm for the plutonium solution experiments, 10 pcm for the uranium metal lattice experiments, 20 pcm for the uranium dioxide lattice experiments, 22 pcm for the MOX fuel lattice experiments, and 150 pcm for the LCT001 uranium oxide assembly experiments. Accordingly, the TPEX library demonstrates excellent performance in reactivity predictions for PWRs.

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P05

Title: EXFOR Contribution Templates

Authors: Konstantinos Panagiotis Christopoulos (NTUA), Anastasia Georgiadou (OECD Nuclear Energy Agency), Julia Sprenger (OECD Nuclear Energy Agency).

Abstract:
The EXFOR database serves as a cornerstone for the preservation and dissemination of experimental nuclear reaction data. This contribution presents an ongoing effort to develop standardized templates for the most common measurement types represented in EXFOR, with the objective of enabling experimentalists to directly provide structured data suitable for integration into the database. The approach begins with the identification of the most populated reaction categories within EXFOR. Representative entries from these categories are systematically converted into issue templates within an existing NEA GitLab repository dedicated to EXFOR article compilation.

This work is part of the broader modernization strategy of the NEA Data Bank, aimed at improving data management practices, enhancing transparency, and supporting FAIR (Findable, Accessible, Interoperable, Reusable) principles in nuclear data workflows. While the NEA Data Bank holds responsibility for data originating from European facilities, the proposed templating system is designed with global applicability in mind and is expected to benefit the international experimental community.

P06

Benchmarking of fluorine cross-section

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Even the most advanced simulation codes are only as reliable as the fundamental nuclear data driving them. Benchmark experiments serve as the essential bridge between raw, evaluated data libraries (such as ENDF/B, JEFF, or JENDL) and real-world applications. While differential measurements quantify specific, isolated cross-sections, integral benchmark experiments—such as high-fidelity critical assemblies or well-characterized shielding configurations—test how these data interact collectively within a physical system.

Fluorine is an important element for future Generation IV reactors, namely, molten fluoride salts are planned as coolants in the Molten Salt Reactor (MSR). Fluorine is also vital in nuclear fuel production, primarily through its role in creating uranium hexafluoride (UF_6). Due to these applications, it is necessary to know fluorine cross-sections precisely.

Recently, the fluorine cross-section was updated within the INDEN collaboration [1], adopted by ENDF/B-VIII.1. The new fluorine evaluation was validated against criticality benchmarks, showing improvement. However, due to the absence of an updated TSL (Thermal Scattering Law) matrix, the evaluation needed to be validated against a benchmark unaffected by TSL.

Integral measurements, including measurement of neutron leakage flux and reaction rate distribution, were performed using a PTFE (Polytetrafluoroethylene, CF_2) block with a ^{252}Cf(s.f.) source inside. PTFE was chosen as a suitable compound for high fluorine content and easy handling. Carbon, as a second element, can be considered well-defined from the point of view of cross-sections [2]. The measurements were carried out at the Research Centre Řež.

In the benchmark, a block of 59 cm × 50 cm × 50 cm (thickness × height × width) was assembled from eleven 5.4 cm thick PTFE plates. The central plate has a central hole for placement of a ^{252}Cf(s.f.) neutron source. Detailed information about experiments can be found in ICSBEP benchmark RCR ALARM-Cf-PTFE-SHIELD-001 [3].

The fast neutron leakage spectrum was measured using hydrogen proportional detectors (HPD) and a stilbene scintillator. The energy range of 0.1 MeV to 1.3 MeV was measured with HPD, and the range of 1.0 MeV to 12.0 MeV was measured with the stilbene detector.

In addition to leakage experiments, large irradiation experiments were conducted in which the activation foils were placed on the block and between individual plates. Experiments included the large foil set, which contained activation foils sensitive to the thermal, epithermal, and fast neutron energy regions. The materials were indium, nickel, titanium, tantalum, and gold.

The measurements, conducted with hydrogen proportional detectors and stilbene scintillators, revealed discrepancies between the measured and calculated neutron spectra. The HPD measurements, spanning 0.1-1.3 MeV, showed that all tested nuclear data libraries underpredicted the measured spectrum, with discrepancies observed across the entire energy range. Similarly, the stilbene measurements spanning 1.0-12.0 MeV showed that while the INDEN fluorine evaluation was within one sigma uncertainty for most of the energy range, other libraries matched the experimental data only at higher energies. Reaction rate measurements using activation foils provided additional insights into the accuracy of the evaluated cross-sections, especially inside the PTFE block.

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P07

Determination of the (n, xp) cross section of unstable nuclei ^{54}Mn using surrogate ratio method

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There are several challenges associated with the direct activation method, including the use of unstable target isotopes, the difficulty of producing monoenergetic neutrons over a broad energy range, and the short half-lives of the product nuclei. To overcome these limitations of direct cross-section measurements, several indirect approaches have been developed, such as the Surrogate Reaction (SR) method, Trojan Horse Method (THM), Coulomb Dissociation (CD) technique, Asymptotic Normalization Coefficient (ANC) method, as well as the Oslo and β-Oslo methods [1]. In recent years, the surrogate ratio method has been employed to measure (n, xp) cross sections [2, 3, 4]. These methods have significantly enhanced our ability to obtain nuclear data for reactions that are otherwise difficult to measure. Stainless steel is widely used in various components of fusion reactors, including the first wall, blanket modules, cryostat, and vacuum vessels. In a fast reactor environment, ^{54}Mn ($t_{1/2}$ = 312.1 d) is produced through neutron-induced transmutation reactions from ^{55}Mn, ^{54}Fe, and ^{58}Ni.

In the present work, the ^{54}Mn(n, xp) cross section was measured using the surrogate ratio method, with ^{60}Ni(n, xp) as the reference reaction. The experiment was performed at the BARC-TIFR Pelletron Linac Accelerator Facility, Mumbai. Two surrogate reactions, ^{51}V(^{7}Li, t) and ^{57}Fe(^{7}Li, t), were used to populate the compound nuclei ^{55}Mn* and ^{61}Ni* at beam energies E_{lab} = 34 and 36 MeV, respectively. Proton decay probabilities were determined via coincidence measurements of evaporated protons at backward angles and tritons near grazing angles. The measured ^{54}Mn(n, xp) cross sections were compared with values from evaluated data libraries and statistical model calculations using different level density models. To test the validity of the surrogate ratio method [5], key conditions were examined: (1) equivalence of spin population in neutron-induced and surrogate reactions, and (2) spin-parity convergence of proton decay ratios. In the excitation energy range of 20-26 MeV (corresponding to neutron energies of 10-16 MeV), the results show good agreement with calculated values from TALYS and YAHFC. The results are also consistent with the JENDL-5 and ROSFOND-2010 evaluated data libraries.

The cross section obtained for the ^{54}Mn(n, xp) reaction in the present study is ~1.5 times higher than that reported for ^{55}Mn(n, xp). The higher cross-section values indicate more efficient transmutation of radioactive ^{54}Mn into stable ^{52,53}Cr isotopes. However, this also implies an increase in hydrogen production in the system, which must be considered in relevant applications. These results contribute to the refinement of nuclear data libraries, supporting the advancement of nuclear technologies and its applications.

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P08

Isomeric Cross-Section Measurements for the ^{113}In(n,2n)^{112}In Reaction at 14 MeV Using the NESSA D-T Neutron Facility

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Reactor dosimetry relies on accurate nuclear cross-section data. Activation foils are often the only practical way to measure neutron flux inside a reactor core or near structural components where active detectors cannot survive. Indium is routinely used for this purpose. The ^{115}In(n,n′)^{115m}In reaction (threshold ~0.5 MeV) samples the fast spectrum, while the ^{113}In(n,2n)^{112}In reaction (effective threshold ~9 MeV) responds to the high-energy tail. This high-energy sensitivity is particularly relevant for fusion-fission hybrids, D-T-driven subcritical assemblies, and damage studies in reactor pressure vessels where the 14 MeV component matters. The isomeric yield ratio—the branching between the metastable (4^+) and ground (1^+) states—directly affects how foil activity translates to flux, so experimental validation at 14 MeV is needed to benchmark evaluated libraries used in reactor calculations.

NESSA (**NE**utron **S**ource in Upp**SA**la) is a beamline at Uppsala University built around a sealed-tube D-T neutron generator producing up to 5 x 10^8 n/s at 14.1 MeV. Samples can be placed as close as 3 cm from the target, giving fluence rates ~ 3 x10^6 n/cm²/s. Real-time beam monitoring is performed with ^{235}U and ^{238}U fission chambers, which record neutron yield throughout irradiation. The facility supports cross-section measurements, detector testing, electronic damage study and other work relevant to reactor physics and radiation protection. Fig. 1 shows a 3D reconstruction of NESSA facility with different material shielding like Portland, borated polyethylene, stainless steel collimators, etc.

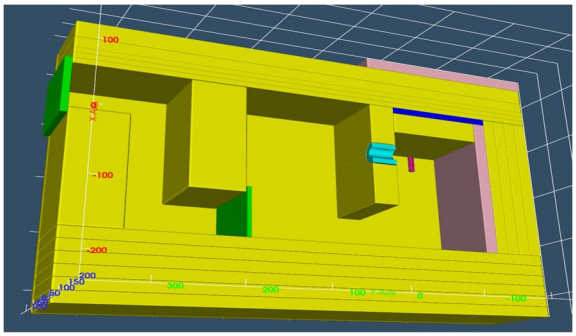


Fig. 1: 3D reconstruction of NESSA beam hall

Experimental Method. We irradiated a natural indium foil (3 mm thick, 3.96 g) for 3 hours at 4 cm from the source. The total fluence was 2.38 × 10^{10} n/cm². After cooling, we acquired gamma spectra with an HPGe detector whose efficiency was determined from FLUKA simulations. We took several measurements over the following hour to track the decay of both the metastable (^{112m}In, $T_{1/2}$ = 20.67 min) and ground (^{112g}In, $T_{1/2}$ = 14.97 min) states.

Cross-section determination required corrections for neutron self-shielding in the thick foil, gamma-ray self-absorption at both energies, and feeding from the metastable to ground state via isomeric transition (treated using the Bateman equations). The ^{115}In(n,α)^{112}Ag reaction produces ^{112}Ag ($T_{1/2}$ = 3.13 h) which emits at 617 keV, overlapping with the ^{112g}In line. We subtracted this interference using a late measurement where both In-112 states had fully decayed, leaving only Ag-112. The Ag contribution was then back-projected to earlier times using its decay constant. We obtain σ_m = 1204 ± 88 mb (7.3%) for the metastable state and σ_g = 326 ± 32 mb (9.9%) for the ground state, giving a total of 1530 mb. The isomeric yield ratio is IYR = σ_m/σ_g = **3.7 ± 0.4**.

We compared our measurements with TALYS-2.2[1] calculations using different nuclear level density models. Table 1 summarises the results for four level density prescriptions.

Table 1. TALYS predictions for ^{113}In(n,2n)^{112}In cross-sections at 14 MeV using different level density models.

Model	Description	σ_m (mb)	σ_g (mb)	Ratio
ldmodel 1	Constant temperature + Fermi gas	1067	316	3.4
ldmodel 2	Back-shifted Fermi gas	1097	345	3.2
ldmodel 5	Temperature-dependent HFB	1103	281	3.9
ldmodel 6	Gogny HFB + combinatorial	1024	275	3.7
Experiment	**NESSA, 14.7 MeV**	**1204 ± 88**	**326 ± 32**	**3.7 ± 0.4**

Our IYR agrees with independent measurements at 13.5–14.8 MeV (literature range 3.7–3.9)[2], cross-validating the NESSA measurement chain.

Our measurements demonstrate that the NESSA facility can produce reliable cross-section data for threshold reactions used in reactor dosimetry. The close source-to-sample geometry gives high fluence rates, and real-time fission chamber monitoring allows accurate flux integration. The experimental IYR = 3.7 ± 0.4 agrees well with TALYS predictions across different level density models, giving confidence in using such calculations for reactor spectrum unfolding where experimental data are sparse. We plan to extend this work to other dosimetry reactions and to measure spectrum-averaged cross-sections relevant to power reactor and fusion environments.

Keywords: D-T neutron generator, isomeric cross-section, neutron activation, reactor dosimetry

1. Real-time beam monitoring is performed with ^{235}U and ^{238}U fission chambers, which record neutron yield throughout irradiation.

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P09

EXPERIMENTAL CROSS-SECTION MEASUREMENTS OF PROTON- AND ALPHA-INDUCED REACTIONS ON NATURAL Fe, Cu, Ti AND Ni TARGETS AT LOW ENERGIES FOR NUCLEAR DATA APPLICATIONS

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Reliable and experimentally validated nuclear reaction data are essential for applications in nuclear medicine, isotope production, radiation shielding, and nuclear data evaluation. In this work, systematic experimental investigations were performed on proton- and alpha-particle-induced reactions on natural iron, copper, titanium, and nickel targets at low energies (<10 MeV). The experiments were carried out at the National Centre for Physics (NCP), Islamabad, using charged-particle beams from a 5 MV Tandem Pelletron accelerator. The activation technique was employed to induce nuclear reactions, and the produced radio nuclides were identified and quantified using high-resolution gamma-ray spectrometry with a high-purity germanium (HPGe) detector. Production cross sections and excitation functions were determined for several reaction channels relevant to both fundamental nuclear reaction studies and applied nuclear technology. The results were compared with previously published experimental data and evaluated nuclear data libraries, showing overall agreement within experimental uncertainties, while also identifying energy regions where data remain sparse or inconsistent. This work contributes to the improvement of charged-particle nuclear reaction databases by providing high-quality experimental data suitable for inclusion in international nuclear data libraries such as EXFOR. The dataset is particularly relevant for validating nuclear reaction models and optimizing low-energy charged-particle induced radioisotope production pathways.

Participation in the Joint ICTP–IAEA Workshop on Nuclear Reaction Data: Experiment and Compilation will further strengthen expertise in nuclear data evaluation and compilation methodologies, enabling effective contribution of experimentally measured nuclear reaction data to the global nuclear data infrastructure.

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P10

Cross sections of the ^{148}Sm(n,α)^{145}Nd reaction in the 4.8–5.3 MeV neutron energy range

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The cross sections of the ^{148}Sm(n,α)^{145}Nd reaction were measured for the first time at neutron energies ranging from 4.8 to 5.3 MeV. The experiment was carried out on the Van de Graaff accelerator EG–5 at the Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research. Fast neutrons were produced via the ^{2}H(d,n)^{3}He reaction with a deuterium gas target. A twin gridded ionization chamber was used as the charged particle detector, with back–to–back ^{148}Sm samples mounted on tantalum backings at the common cathode. The absolute neutron flux was measured using the $^{238}U_3O_8$ sample. The obtained cross section data were compared with those from existing nuclear data libraries and theoretical calculations using the TALYS–1.96 code. The present results for the ^{148}Sm(n,α)^{145}Nd reaction are expected to resolve discrepancies among various nuclear evaluation data.

P11

Exploring differential neutron scattering cross section measurements on the Back-n at CSNS

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A differential neutron scattering cross-section spectrometer has been designed for the Back-n facility at the China Spallation Neutron Source (CSNS). The system consists of an array of dual-mode neutron detectors combined with modular shielding. A proof-of-principle experiment was conducted in parallel with the neutron total cross-section measurement of hydrogen. High-purity carbon and polyethylene (CH) targets were employed for detector calibration and design verification. A prototype detector with modular shielding was positioned at 45° relative to the incident neutron beam at ES#1. The differential neutron scattering cross section of hydrogen at 45° was measured over the energy range from 1 keV to 200 keV and compared with evaluated data from the ENDF/B-VIII.1 library. Good agreement was observed, validating the reliability of the measurement system and spectrometer design. In the future, a multi-angle DDNS spectrometer enabling simultaneous measurements of scattering neutrons will be constructed at the Back-n facility.

P12

Neutron capture by ^{9}Be

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The neutron capture cross-section ^{9}Be(n,γ)^{10}Be was measured using a combination of two precise techniques: neutron activation (NA) and accelerator mass spectrometry (AMS). Beryllium oxide (BeO) samples were irradiated at the High Flux Accelerator-Driven Neutron Facility at the University of Birmingham, Birmingham, UK. Subsequent measurements of the ^{10}Be/^{9}Be isotopic concentrations were performed using AMS at Spanish Accelerator for Radionuclides Analyses (SARA) in the National Accelerator Centre (CNA), Sevilla, Spain. Finally, the neutron capture cross-section in ^{9}Be was indirectly determined at energies of 0.03, 0.8, and 0.9 MeV.

P13

Validation of several reactions in the standard ^{252}Cf(sf) neutron field.

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The following reactions have been investigated: ^{59}Co (n, 2n) ^{58}Co , ^{59}Co (n, γ) ^{60}Co, ^{59}Co (n, p) ^{59}Fe, ^{76}Ge (n, γ) ^{77}Ge, ^{186}W (n, γ) ^{187}W, ^{185}Re (n, 2n) ^{184}Re. Tungsten, rhenium and germanium were chosen for their relevance to fusion application. As the expected neutron spectrum in ITER and DEMO has a significant component bellow 14 MeV, it is important to also validate cross sections in this intermediate energy range. Cobalt is used to measure high energy neutron flux in fission applications. Pure metal samples were irradiated in the standard ^{252}Cf(sf) neutron field. The ^{252}Cf isotope is the only completely characterised neutron source with a well known spectrum in the relevant energy range. The source was surrounded by samples and enclosed in a 30 cm diameter cadmium spherical surface to suppress background. Measured reaction rates were compared against MCNP6.2 [**1**] calculations. The IRDFF-II [**2**], JEFF 4 [**3**], ENDF/B-VIII.1 [**4**] and JENDL 5 [**5**] nuclear data libraries were used to calculate reaction rates. The ^{59}Co (n, p) ^{59}Fe reaction experimental results show agreement with calculation within experimental uncertainty for each library. The ^{186}W (n, γ) ^{187}W experimental reaction rates exhibits discrepancy in comparison to the JENDL 5 library, while the experiment agrees with the other libraries. All the other investigated libraries show a varying level of discrepancy, when experiment is compared with calculation. In the case of the ^{76}Ge (n, γ) ^{77}Ge reaction the difference between experiment and calculation is above 30 % for each library.

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P14

A Physics-Informed Ensemble Predictive Framework Driven by Transfer Learning for the Energy Dependence of Fission Yields

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Fission product yields (FPYs) and their energy dependence are essential for the safety and efficiency of nuclear technologies. However, obtaining complete and accurate FPYs across the 0–20 MeV incident neutron range remains challenging due to limited neutron sources and complex fission dynamics. To address this, we develop an integrated predictive framework through transfer learning that synergistically combines phenomenological models, evaluated data, and physical constraints. This approach establishes a continuous energy dependence of FPYs, providing reliable cumulative yield predictions even in data-sparse regions. Our physics-informed methodology not only enhances the accuracy of FPY evaluations but also offers a generalizable strategy for nuclear data inference in science and engineering applications.

P15

Deuteron-Induced Reactions on Natural Iron Near the Reaction Threshold: Updated Measurements and EXFOR Compilation

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We report on a renewed measurement of deuteron-induced nuclear reactions on natural iron targets at low energies, close to the reaction threshold. The measurements were originally performed as part of the first author's MSc thesis research in 2009, but the resulting data were never compiled into the EXFOR database. We are repeating these measurements with updated experimental methods to produce improved excitation function data, with the goal of publishing the results in a peer-reviewed journal and submitting them for EXFOR compilation.

This work aims to fill a gap in existing nuclear reaction data for iron in the threshold region and contributes directly to the broader effort of expanding and updating experimental coverage of charged-particle-induced reaction data.

P16

Measurement of activation cross sections of ^{7}Li-induced reactions on ^{nat}In

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Charged-particle-induced reactions are widely used for the production of radionuclides for applications in nuclear medicine. ^{7}Li-induced reactions on natural indium (^{nat}In) are of interest because they can produce the medically important radionuclide ^{118}Te ($T_{1/2}$ = 6.00 d) through the reactions ^{113}In(^{7}Li,2n)^{118}Te and ^{115}In(^{7}Li,4n)^{118}Te. This isotope can serve as the parent nuclide of the ^{118}Te/^{118}Sb generator system [1], providing a convenient and transportable source of ^{118}Sb ($T_{1/2}$ = 3.6 min). Owing to its short half-life, high positron emission probability (73.5%), and relatively low intensity of accompanying high-energy γ-rays, ^{118}Sb is considered a promising radionuclide for diagnostic imaging and first-pass angiography.

Despite the potential importance of this production route, experimental nuclear reaction data for ^{7}Li-induced reactions on ^{nat}In remain missing. To address this deficiency, activation cross sections and thick-target yields (TTYs)[2] were investigated using the stacked-foil activation technique. Irradiations were performed with 72 MeV ^{7}Li beams delivered by the AVF cyclotron at RIKEN.

In this work, activation cross sections and thick target yields of ^{7}Li-induced reactions on ^{nat}In were measured. Two independent experiments were conducted: one aimed at measuring excitation functions and the other at determining thick target yields for selected reactions. Radioactive reaction products were identified and quantified by high-resolution gamma-ray spectrometry. Data analysis is currently in progress. Preliminary results indicate successful production and identification of several reaction products.

Experimental TTY values will be compared with theoretical TTY values calculated by integrating the measured excitation functions together with the stopping power of the target material. This comparison will provide an additional consistency check and independent validation of the measured cross sections. The resulting data are expected to contribute to nuclear reaction databases and radionuclide production studies.

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P17

Neutron elastic cross section measurements with the upgraded ELISA setup

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Neutron elastic and inelastic scattering reactions are of significant importance in the operation of a nuclear reactor core. JRC-Geel (Belgium) developed the ELISA setup (Elastic and Inelastic Scattering Array) to measure such cross sections for structural materials in the fast energy range, between 1 and 8 MeV. The ongoing experimental work there aims to explore the nuclear data of stable copper isotopes (^{63,65}Cu). Copper is used in some nuclear facilities, such as TAPIRO at ENEA (Italy) and in critical assemblies, such as COMET in LANL (US), as a thick reflector.

The ELISA setup located at the GELINA facility (Geel Electron Linear Accelerator) of JRC-Geel consists of 32 liquid scintillators for measuring the scattered neutrons and a uranium fission chamber for monitoring the beam and measuring the incoming neutron flux. The array has been upgraded for the aforementioned measurements by the addition of 8 Li-glass scintillators, enriched in ^{6}Li. The upgrade aims to extend the low energy detection limit below 1 MeV.

Within this campaign, a natural copper target has also been measured to model our response functions and validate our analysis procedure, since its cross section is known with high accuracy below 4.8 MeV and it is considered a standard up to 1.8 MeV.

The data analysis procedure and preliminary results will be presented for the two different types of detectors used in the experiments.

P18

Differential Cross-Section Measurements for p + ^{12}C Elastic Scattering at Ep = 0.95–3.2 MeV

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Accurate low-energy nuclear reaction data are essential for nuclear physics studies and applications, yet experimental datasets for light nuclei remain incomplete in several energy regions. New measurements of angular differential cross sections for p + ^{12}C elastic scattering, which were recently published in IEEE Transactions on Nuclear Science [1], are reported for proton energies between 0.95 and 3.2 MeV using the 5SDH-2 Pelletron tandem accelerator at the VNU-University of Science.

The measurements were performed with a multi-angle silicon detector setup covering several scattering angles. Particular attention was devoted to the resonance region around Ep ≈ 1.6–1.8 MeV, where rapid variations of the excitation functions are observed. The obtained cross sections were compared with previously published experimental data and analyzed using the R-matrix formalism to investigate resonance structures in the compound nucleus ^{13}C.

This contribution provides new experimental datasets with carefully evaluated uncertainties and well-defined experimental conditions. These data are suitable for future compilation into the EXFOR database and contribute to improving the availability and reliability of low-energy charged-particle reaction data for nuclear science applications.

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P19

Resolving discrepancies in evaluated nuclear data through combined experimental techniques: the case of chromium.

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Nuclear data of high quality is crucial for reactor design, criticality safety calculations and advanced nuclear technology applications. However, significant discrepancies persist in several neutron-induced reaction cross sections, particularly in some isotopes related to reactor structural materials. In this work, we present a combined analysis of two recent experimental studies on the ^{50}Cr and ^{53}Cr neutron capture cross sections, performed through complementary differential and integral approaches.

First, a time-of-flight measurement of ^{50,53}Cr was performed at the EAR1 of CERN n_TOF facility [1] to obtain new (n,γ) cross sections between 1 and 100 keV. The use of very thin and enriched samples and low neutron-sensitivity C_6D_6 detectors allowed for a substantial reduction in the neutron-scattering effects that affected the previous measurements. In parallel, a neutron activation measurement at the HiSPANoS facility of CNA [2] (Seville, Spain) determined for the first time the Maxwellian Averaged Cross Section (MACS) of ^{50}Cr at kT = 30 keV using this technique.

The comparison between both experimental approaches demonstrates a remarkable consistency and provides strong evidence against the increase in the chromium capture cross sections proposed in the new evaluated library INDEN [3] and then adopted by ENDF/B-VIII.1 and JEFF-4.0. These results highlight the power of combining differential and integral measurements as a robust strategy to benchmark evaluations, identify hidden systematic biases and improve the reliability of nuclear databases. The methodology presented here constitutes a powerful framework for future validation campaigns of cross sections relevant to nuclear energy, criticality safety or astrophysical applications.

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P20

From Experiment to Data: Measurement of the $^{17}O(n,p)^{17}N$ Integral Cross Section at the KATANA Facility

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Water is used as a coolant in most nuclear fission power plants, research reactors, and planned future fusion reactors. It is activated by nuclear reactions involving oxygen isotopes: $^{16}O(n,p)^{16}N$, $^{17}O(n,p)^{17}N$, and $^{18}O(n,\gamma)^{19}O$. The resulting radioisotopes of oxygen and nitrogen subsequently decay, emitting gamma rays and neutrons with various energies. The reaction $^{16}O(n,p)^{16}N$ has a threshold at neutron energies of about 10 MeV, $^{17}O(n,p)^{17}N$ at about 9 MeV, while $^{18}O(n,\gamma)^{19}O$ occurs with thermal neutrons. Due to the low abundance of the ^{17}O isotope in water and the high energy threshold for its reaction cross-section, this reaction has not been extensively studied in fission research. However, in nuclear fusion, this reaction is important because the decay of ^{17}N releases neutrons in the primary cooling circuit, which poses a significant limitation for operation. As the realisation and licensing of ITER, the largest research fusion reactor being built by 35 countries in Cadarache, southern France, approaches, the need for research on water activation under fusion conditions has become apparent.

Developing accurate and reliable simulations of dose fields arising from activated water is a complex physics problem that requires reliable input data in the form of nuclear data libraries for neutron interactions with oxygen isotopes as well as reliable libraries for interactions with high-energy gamma rays. The cross section for the $^{16}O(n,p)^{16}N$ reaction is relatively well known, while the cross sections for $^{17}O(n,p)^{17}N$ and $^{18}O(n,\gamma)^{19}O$ are poorly known due to measurement discrepancies, partly contradictory experimental data and inconsistent evaluations in the nuclear data libraries. Due to significant uncertainties in the nuclear data, there are corresponding uncertainties in the calculated values of water activation (8% – 54%) and, consequently, in the dose rates [1]. This can result in relatively high safety factors, leading to increased complexity and higher costs for the construction and operation of fusion plants, as well as challenges in the efficient planning and operation of future commercial fusion reactors.

A comprehensive methodology has been established, combining experimental measurements at the KATANA facility with advanced simulations to validate nuclear cross sections in water activation processes. Within this framework, the integral cross section of the $^{17}O(n,p)^{17}N$ reaction has been successfully measured. This work has provided valuable feedback to the nuclear data evaluation community, contributing to improved reliability of nuclear data. In parallel, the KATANA experimental facility has been brought to a fully operational and well-characterised state, providing precisely defined experimental conditions for high-quality research on water activation in fusion-relevant environments [2].

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P21

RAMEN: Neutron Capture and Total Cross Section Measurements of Copper at n_TOF

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Copper is a key structural and reflector material in fast-spectrum nuclear systems such as the RSV–TAPIRO research reactor (ENEA–Casaccia, Italy), where sensitivity and uncertainty studies have shown that the choice of evaluated copper library can shift the effective multiplication factor k_{eff} by up to 600 pcm, comparable to the reactivity worth of a control rod, while major evaluated libraries (ENDF/B-VIII.0, JEFF-4.0, JENDL-5.0) disagree by up to 30% in the unresolved resonance region. Copper is also relevant for nuclear medicine, where ^{64}Cu is produced via the ^{63}Cu(n,γ)^{64}Cu reaction for PET imaging and targeted radiotherapy, and for nuclear astrophysics, as an iron-peak element whose nucleosynthetic origin remains poorly constrained: its Maxwellian-averaged capture cross sections carry uncertainties that directly limit s-process modelling in massive stars.

To address these needs, the RAMEN measurement campaign was launched by ENEA and INFN within the Euratom-funded APRENDE project, in partnership with the n_TOF collaboration at CERN. Two data-taking campaigns have been completed at the high-resolution experimental area EAR1: radiative capture cross sections of ^{63}Cu and ^{65}Cu, measured in 2024 using an array of C_6D_6 liquid scintillation detectors, and the total cross section of ^{nat}Cu, measured in 2025 via neutron transmission using a Low Mass Fission Chamber loaded with ^{235}U deposits. For the capture data, the analysis is now progressing toward yield extraction and resonance shape analysis. For the transmission data, a preliminary total cross section has been extracted from thermal energies up to approximately 30 MeV, in good agreement with existing data and extending the energy coverage well beyond previous measurements, into the region most relevant for the fast-neutron spectrum of TAPIRO.

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P22

A database of gamma-ray emission cross-sections for 14.1 MeV neutron-induced reactions

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The study of characteristic γ-ray emission from fast neutron-induced reactions is crucial for both fundamental nuclear physics and applied research. It provides valuable information about nuclear structure and the probabilities of exciting specific nuclear states. Gamma-ray spectroscopy of products of reactions with fast neutrons (particularly around 14 MeV) is a prospective technique for investigating the elemental composition of materials.
A comprehensive series of experiments to measure γ-ray emission cross-sections has been conducted within the framework of the TANGRA (TAgged Neutrons and Gamma-RAys) project at the Frank Laboratory of Neutron Physics, JINR [1-3]. The experimental setup employed four $LaBr_3$(Ce) scintillators positioned at different angles to measure angular distributions of γ-rays and two high-purity germanium (HPGe) detectors used for high-quality γ-spectroscopy. The ING-27 D-T neutron generator provided 14.1 MeV neutrons, and the tagged neutron method was utilized to precisely select events originating from the sample under study.
As a result, γ-ray emission cross-sections were measured for 53 elements. Significantly, for 20 of these elements, the data were obtained for the first time. The results of these experiments were compiled to a database which could be useful for fundamental and applied purposes. This report will discuss the key features of the experiments, the content and structure of the database, and the current status of experimental data for γ-ray emission cross-sections.

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P23

Development and Validation of a New Computational Model of a Production Target Intended for the Production of Radiopharmaceuticals

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This work focuses on the development and validation of a computational model of a cyclotron target for radiopharmaceutical production, building directly upon previous research in this field [1, 2, 3]. Secondary neutron field generated during proton irradiation is investigated for potential use in neutron activation. Suitable activation reactions with different energy thresholds were selected, specifically focusing on reactions including ^{59}Co(n,2n)^{58}Co, ^{59}Co(n,p)^{59}Fe, ^{59}Co(n,γ)^{60}Co, ^{197}Au(n,2n)^{196}Au, ^{197}Au(n,γ)^{198}Au, ^{63}Cu(n,γ)^{64}Cu, ^{65}Cu(n,2n)^{64}Cu, ^{181}Ta(n,γ)^{182}Ta ^{113}In(n,n')^{113m}In, ^{113}In(n,γ)^{114m}In, ^{115}In(n,2n)^{114m}In, ^{115}In(n,n')^{115m}In, ^{115}In(n,γ)^{116m}In.

An experimental setup was designed to be comparable to previous experiments, where a set of activation detectors was placed inside a specialized $^{10}B_4C$ filter capsule to effectively suppress thermal neutrons and investigate the neutron energies in the epithermal region. Activated samples from the current setup were subsequently measured using a High-Purity Germanium (HPGe) detector, and the respective reaction rates and activities were evaluated.

The experimental results are compared with comprehensive transport simulations performed using the FLUKA Monte Carlo code [4]. Neutron spectra are calculated at selected positions to enable a detailed comparison with the experimental data. Furthermore, to evaluate the cross-sections within the simulations, various nuclear data libraries are utilized and mutually compared. This comparison aims to assess the impact of different data evaluations on the precision of the simulated reaction rates, highlighting the critical role of nuclear data accuracy in predicting activation in complex cyclotron environments. Preliminary results show considerable discrepancies between the experimental and calculated data when using libraries such as IRDFF-II or ENDF/B-VIII.0, with the differences being especially significant for the non-threshold (n,γ) reactions. These findings strongly indicate that the currently available nuclear data libraries may not provide an optimal description for this specific experimental setup, emphasizing the ongoing need for further data evaluation and refinement.

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P24

EXFOR Studio: A Modern Graphical Toolkit for EXFOR Data Compilation

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Introduction

EXchange FORmat (EXFOR) is a standardized scheme for experimental nuclear reaction data archive which is maintained by Nuclear Reaction Data Centres (NRDC) [1].

There are software tools dedicated to EXFOR data compilation such as EXFOR Editor [2] and HENDEL [3]. However, maintaining and extending HENDEL at JCPRG has become increasingly difficult as software environments and compilation requirements evolve. To address these issues, we launched an open-source project called "EXFOR Studio," a new graphical toolkit for EXFOR compilation and editing. The project aims to provide a modern and user-friendly environment while maintaining compatibility with the existing EXFOR framework.

Current Status and Future Plans

EXFOR Studio is now developed in the PyQt6 framework. The software tool employs the J4 format as an intermediate representation of EXFOR entries, enabling manipulation of hierarchical EXFOR structures through the JSON-compatible format. At the current prototype stage, EXFOR Studio can read and write bibliographic information of EXFOR entries and reconstruct EXFOR-formatted text from the internal J4 representation, yet further development is needed for experimental setups and numerical data sections to generate complete EXFOR entries (Figs. 1 and 2). The graphical bibliography editor has been implemented together with DOI lookup and CrossRef integration for automatic bibliographic metadata retrieval.

Future development will focus on implementing a validation engine and integrated nuclear data visualization. In addition, machine learning-assisted EXFOR compilation is being considered as a long-term plan of the project.

The software tool has been tested successfully on Windows 11 and Linux systems including Fedora 43. Development is carried out by a three-member collaboration with major implementation work performed in Hokkaido University. The software tool is planned to be released as an open-source package through Git-based repositories.

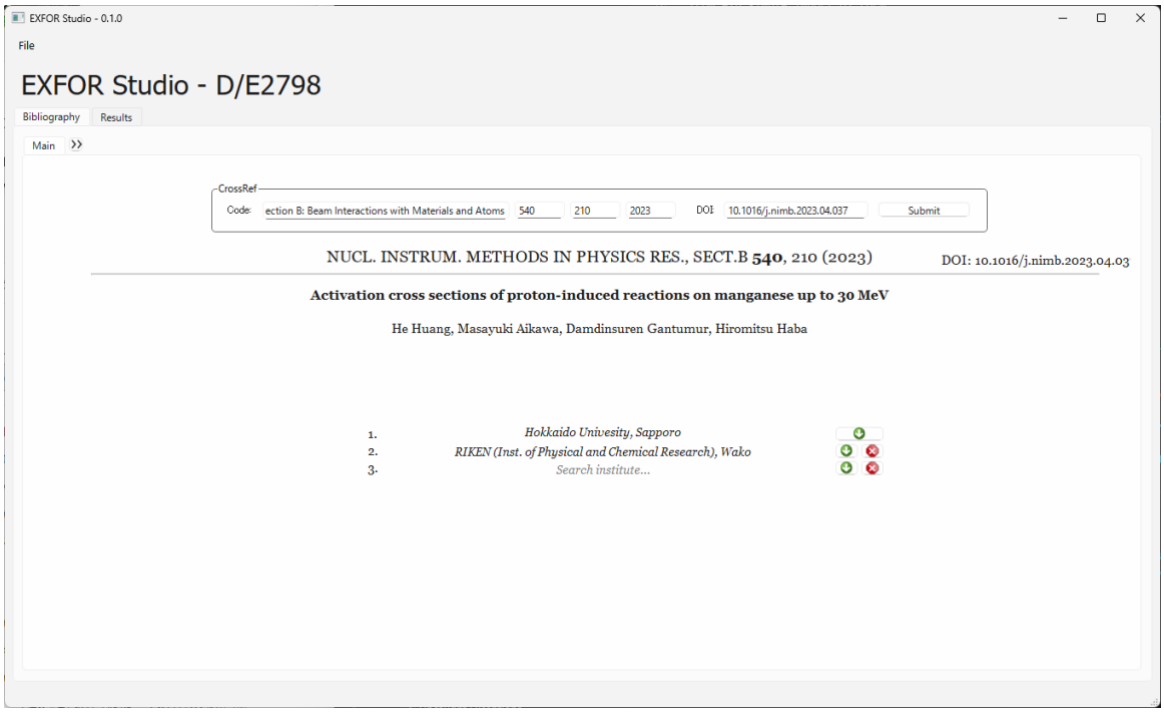


Fig. 1. Preliminary bibliographic interface with CrossRef reference.

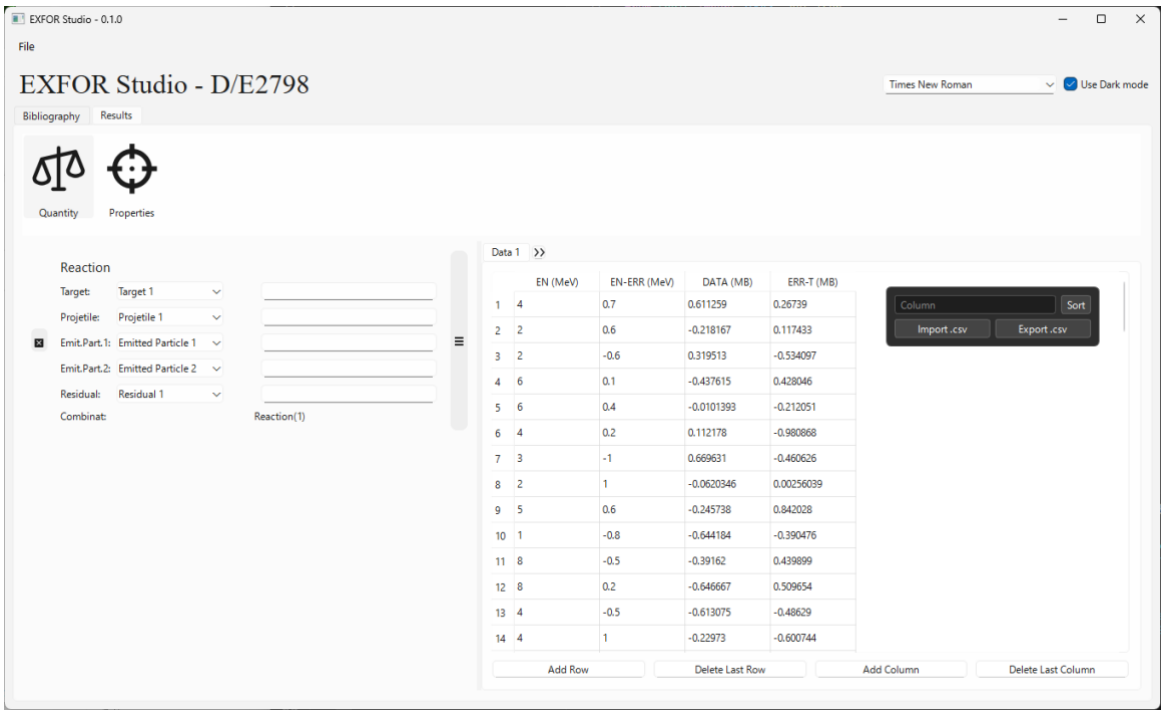


Fig. 2. Preliminary experiment section.

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P25

New interpretation of fission yields experiments based on EXFOR

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Independent and cumulative fission yields, which represent the production probability of fission products, are essential for understanding nuclear fission processes and advanced reactor physics calculations. Evaluations are conducted using experimental data from the EXFOR database, completed by models to ensure completeness in order to achieve a statistically coherent estimation of each yield, supplemented by a correlation matrix. The recent JEFF-4.0 evaluation has highlighted the compatibility limits between data and phenomenological models, necessitating a new evaluation. This new evaluation would be primarily focused on isobaric yield distribution, $P(Z|A)$, with their correlations, as previous work mainly focused on mass and chain yields. [1,2]

This study introduces a new tool that utilizes the EXFOR database to extract independent, cumulative and fractional yield data. On parallel, new $P(Z|A)$ data from recent measurements performed at LOHENGRIN recoil mass spectrometer at the *Institut Laue-Langevin*, will be shown. These data will be integrated into models such as the Z_p *model* and its derivatives to produce fission yield evaluations in the framework of the future JEFF-4.1 nuclear data library. The proposed methodology aims to enhance the accuracy and reliability of the experimental data used, ensuring robust and trackable evaluations.

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P26

Measurement of excitation functions of the alpha particle-induced nuclear reactions up to 50 MeV on holmium target

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Owing to their high linear energy transfer and short tissue range, Auger electron-emitting radionuclides exhibit potent, localized cytotoxicity, making them highly effective for targeting micrometastases while sparing healthy tissue. In this context, ^{165}Er is a promising therapeutic candidate, decaying via electron capture to emit low-energy Auger electrons (5.3 keV at 65.6% and 38.4 keV at 4.8%).

A viable production pathway is the ^{165}Ho(α,4n)^{165}Tm → ^{165}Er reaction cycle. Optimizing the incident alpha-beam energy requires a precise understanding of the excitation functions for all alpha-induced reactions on the holmium target. However, existing literature on ^{165}Ho(α,x) cross-sections remains highly discrepant.

Advantageously, natural holmium is monoisotopic (^{165}Ho), which simplifies both selective isotope production and data evaluation. Furthermore, as a soft, malleable rare-earth metal, holmium is chemically stable and corrosion-resistant under ambient conditions, ensuring safe and straightforward target fabrication and handling.

This study investigates the indirect production of ^{165}Er via the ^{165}Ho(α,n)^{165}Tm reaction pathway. Utilizing the stacked-foil activation technique, natural holmium targets were irradiated with a 50 MeV alpha-particle beam to determine the excitation functions for ^{165,166,167,168}Tm from their respective reaction thresholds up to the maximum bombarding energy.

P27

Impact of Evaluated Nuclear Data and Recent n_TOF Capture Measurements on IFMIF-DONES Activation Predictions

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The IFMIF-DONES facility will irradiate candidate structural materials for future fusion power plants with neutrons produced by 40 MeV deuterons striking a liquid lithium target [1]. The resulting spectrum extends to about 55 MeV, well above the 14 MeV peak of deuterium tritium devices, and reaches an energy region where evaluated cross section libraries disagree appreciably and covariance information is often incomplete or absent. Predictions of activation inventories, decay heat, shutdown dose rates and waste classification timelines rest on these data, and their reliability determines how maintenance and waste management of the facility can be planned.

This contribution presents an assessment of how nuclear data selections propagate into operational activation quantities. Neutron transport and activation are computed with MCNP6 [2] coupled to FISPACT-II [3] through the rigorous two step (R2S) method for a model of the DONES test cell and High Flux Test Module. The calculation sequence is repeated with FENDL-3.2c [4], JEFF-4.0, ENDF/B-VIII.1 and JENDL-5 transport data together with TENDL based activation files, and pathway analysis identifies the reactions responsible for the largest spread between libraries. Where covariance data exist they are propagated to uncertainty estimates on shutdown dose rates and nuclide inventories, and the reactions and energy ranges for which covariances are missing are documented.

Particular attention is given to the connection between new measurements and facility level predictions. As a demonstration case, the recent n_TOF measurement of the ^{50}Cr and ^{53}Cr capture cross sections [5], which differs from values adopted in current evaluations by up to several tens of percent in the measured resonance region, is propagated through the activation workflow. Chromium makes up about nine percent of the EUROFER steel used in the test modules, and capture on ^{50}Cr feeds ^{51}Cr, a relevant gamma emitter at cooling times foreseen for maintenance. The outcome is a ranked list of reactions for which new measurements, evaluations or covariance work would most improve the reliability of DONES activation predictions. The work relies throughout on experimental data compiled in the EXFOR library [6] and is intended as feedback from a data consuming facility to the measurement and compilation community.

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Study of ^{181}Ta(n,γ)^{182}Ta reaction cross-section

P28

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Tantalum is essential in reactor engineering for its structural resilience and in nuclear medicine for its isotope, ^{182}Ta, a widely used γ-ray source [1]. The excitation function of the ^{181}Ta(n,γ)^{182}Ta reaction was measured utilizing neutron activation technique and offline γ-ray spectroscopy in the energy range 1.3 to 3.0 MeV [2]. The experiment was carried out at FOTIA (Folded Tandem Ion Accelerator) Facility, BARC, Mumbai, India. The neutrons were produced through the ^{7}Li(p,n) reaction. The neutron flux was estimated using the ^{115}In(n,n'γ)^{115m}In monitor reaction. The induced radioactivity was quantified using a HPGe detector. The decay data of γ-ray energy and associated uncertainties were extracted from NuDat-3.0 [3]. These decay data play a major role in the evaluation of cross-section of the particular reaction.

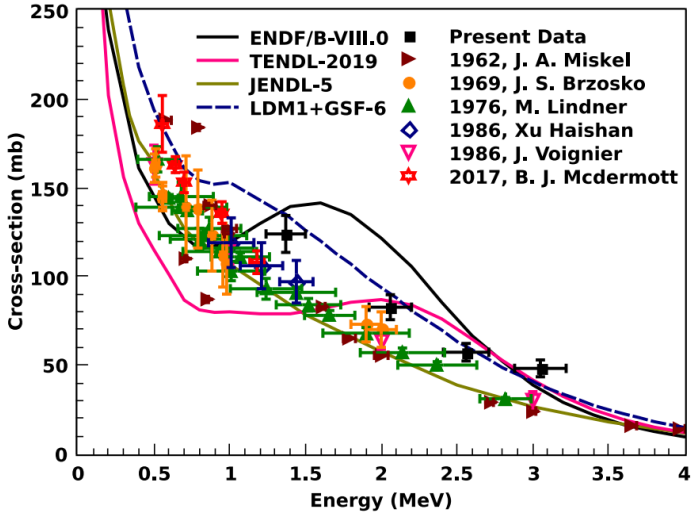


Fig. 1. The measured cross-section of ^{181}Ta(n,γ)^{182}Ta with previous experimental data and different evaluated data libraries.

The uncertainties were estimated for the measured cross-sections using the covariance technique [4,5]. Necessary corrections for γ-ray true coincidence summing and low-energy background neutrons were incorporated in the existing results. Theoretical predictions were computed using the nuclear reaction code TALYS-2.0 [6]. The resultant cross-section data is compared with different evaluated data libraires, theoretical calculations and existing cross-section data available in the EXFOR data library.

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P29

Production and Evaluation of Cobalt Radioisotopes via Charged-Particles Induced Reactions on Nickel and Copper Targets

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Cobalt has important radioisotopes for medical and industrial applications, such as ^{57}Co which is useful in SPECT procedure and as calibration standard [1], while ^{60}Co finds application as a gamma ray source [2]. Several production techniques are available for the production of these isotopes, with each method having its merits and demerits. To analyse the production cross section and thick target yield behaviour of some cobalt isotopes in relation to target selection, incident energy range and projectile particles, a systematic study was carried out in the present work in which nickel and copper foils were stacked and irradiated, on different occasions, with an incident energy of 24 MeV deuteron and 50 MeV alpha particles beams, respectively, using AVF cyclotron at RIKEN, the Nishina Center for Accelerator-Based Science, Wako, Japan. Gamma spectroscopy of the reaction products were carried out using the Maestro software by ORTEC. The cross sections as well as thick target yields were calculated for the $^{55\text{-}57,\ 58g,\ 60g}$Co radioisotopes within the investigated energy range of each route. Similarly, the EMPIRE 3.2 was also used in this work to evaluate the cross sections of the investigated cobalt radioisotopes of interest. The present experimental results were compared with the evaluated empire prediction, literature experimental data, as well as the theoretical data from TENDL, a Talys-based evaluated cross sections in TENDL database. The theoretical evaluations only give a good estimate of most of our experimental data but could not precisely reproduce it.

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P30

Neutron Induced Reaction Cross Sections on Uranium in the Fast Neutron Energy Range

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Neutron-induced reaction cross sections on uranium are of considerable importance for the design and analysis of advanced nuclear systems such as fast reactors and accelerator-driven systems (ADS). Reliable nuclear data in the fast neutron energy region are essential for understanding fission dynamics, neutron economy, and transmutation processes in uranium and thorium-based fuel cycles, as emphasized in earlier investigations [1-4]. In the present work, cross sections of neutron-induced reactions on ^{238}U have been investigated in the fast neutron energy range using the activation technique followed by high-resolution gamma-ray spectrometry. The experiments were carried out using quasi-monoenergetic neutrons generated through proton-induced reactions. Irradiations were performed under controlled beam conditions with proton energies of 7.0, 11.0, 15.0, and 18.8 MeV and beam currents in the range of 100–150 nA. Uranium and thorium foils were used as target materials and neutron flux was determined using standard monitor reactions, following established experimental procedures [1,2].

The measured cross sections show a systematic increase with neutron energy, with representative values ranging from 5.08 ± 0.17 mb to 16.63 ± 0.95 mb, indicating enhanced reaction probability in the fast neutron region. The results are in reasonable agreement with previously reported experimental data [1,3]. The present measurements contribute to improving the database of neutron-induced reaction cross sections in the intermediate to high-energy region, which is essential for nuclear model calculations and evaluated nuclear data libraries. Similar work has been done by both authors for ^{232}Th [1].

The generated data are important for estimating fission product yields, studying neutron-induced reaction channels and assessing radiation damage in structural and fuel materials. These results are particularly relevant for the development of thorium-based nuclear systems, where uranium isotopes act as key intermediates. Additionally, such data are useful for shielding design, safety analysis and isotope production [4,5]. Future work will focus on extending these measurements to other actinides and structural materials and improving the precision of cross-section data at higher neutron energies.

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P31

Study on Uncertainty Evaluation Method for Fast Reactors Based on Large-Scale Sensitivity Database

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To address the challenge that the uncertainty of the effective multiplication factor k_{eff} in fast neutron reactors cannot be rapidly and accurately assessed in the absence of dedicated experimental data, this study proposes an integrated methodology based on a large-scale sensitivity database of critical benchmark experiments. For the first time, a sensitivity database covering 2,138 critical experimental facilities is constructed, and an automated system for similarity analysis and nuclear data adjustment is developed on this basis. Using this system, 45 highly similar benchmark experiments are screened out for the China Experimental Fast Reactor (CEFR). Nuclear data adjustment is performed via the generalized linear least-squares method with these experimental data. The nuclear-data-dominated k_{eff} uncertainty of the CEFR is significantly reduced from the prior 1.01% to 0.141%, with a reduction rate of 86%. The results demonstrate that the proposed method achieves strong performance in both the quality of benchmark recommendations and the optimization of uncertainty quantification.

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