Exfor workflow and distribution modernization

Julia Sprenger

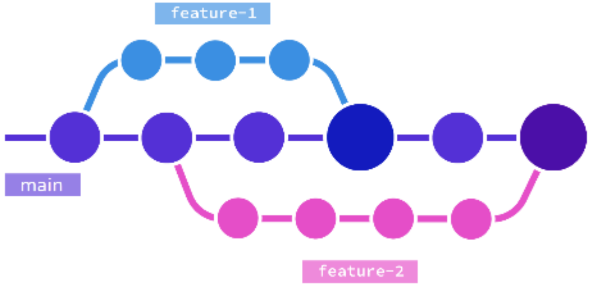
Nuclear Energy Agency Databank

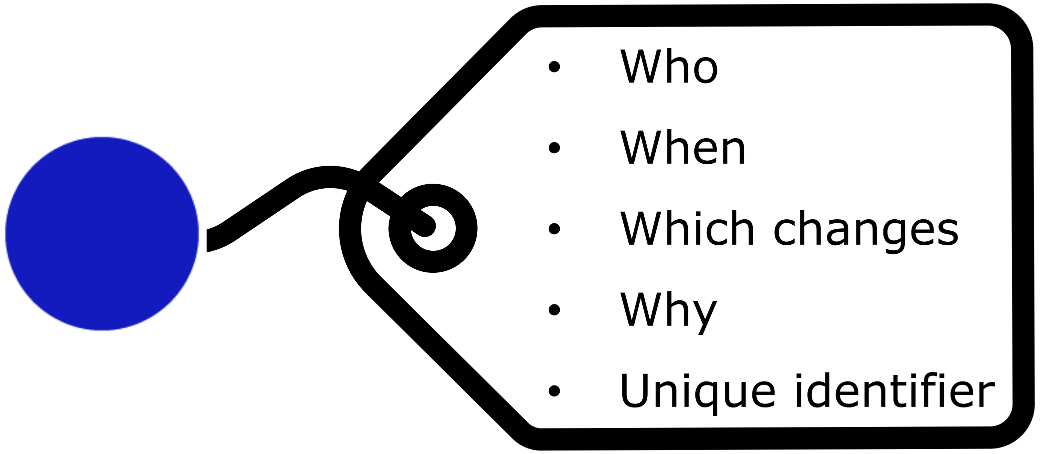
10.5281/zenodo.15655256

Project collaboration support

Established Tools for

- Version / change tracking
- Systematic attribution of contributions
- Distributed collaboration
- Coordination & review of contributions
- Consistency of format
- Consistency of data





Version Controlled Exfor Files

- Automatically updated repositories via GitLab Actions
- Option to use GitLab Actions for automatic review and quality control
- Can serve as versioned input for other tools and workflows
- Continuous deployment
  - Generate latest Exfor file once trans file is available
  - Registers a DOI for each Exfor main file (Zendo Sandbox & NEA Demo Data Platform)
  - [Outlook] registration of DOI on a single-entry level

Repository references

NEA compilations

- https://git.oecd-nea.org/exfor/compilation/prelim

NRDC *Open Area* files

- https://git.oecd-nea.org/exfor/nrdc

NEA reviews of prelim files

- https://git.oecd-nea.org/exfor/nrdc/review/prelim

Latest Exfor Files

- https://git.oecd-nea.org/exfor/exfor-main
  (exploded file version, compare also to EXFOR-Archive)

EXFOR updates and outlook

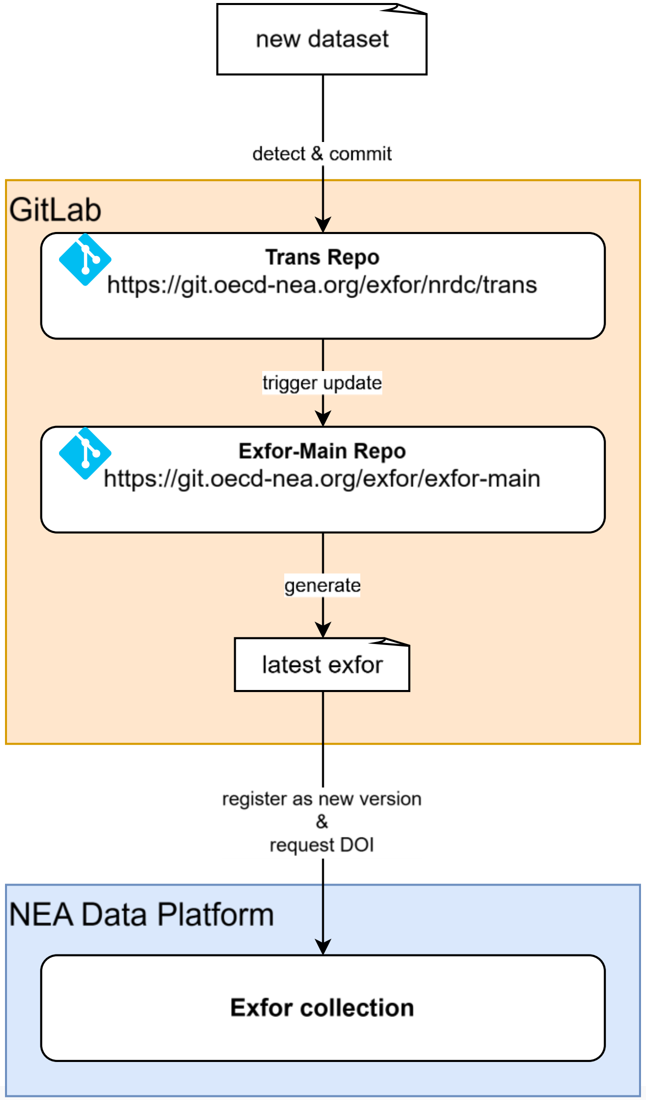
Implemented

- Automatic change tracking of NRDC resources
- Public git repositories for collaboration and feedback
- Email notification system for EXFOR updates
- Git-managed and PyPI-distributed NRDC scripts

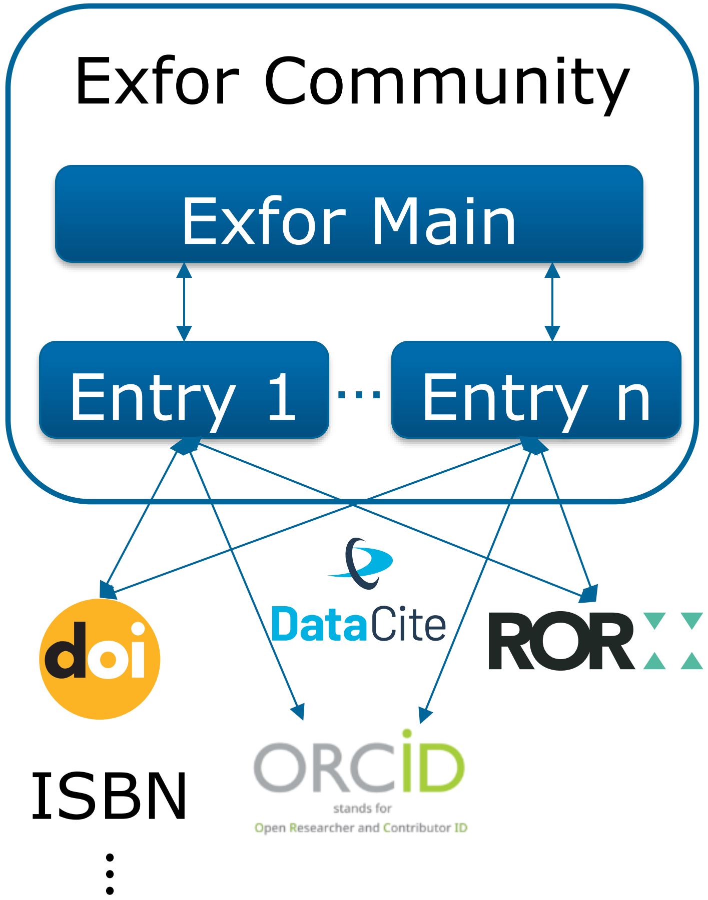
Upcoming

- Automatic publication of EXFOR main on NEA Data Platform
- DOI generation on a fine-grained level
- Continuous updates, including DOI assignment

Continuous deployment pipeline



Outlook: NEA Data Platform



Example Data Entry

Query (Community/Global)

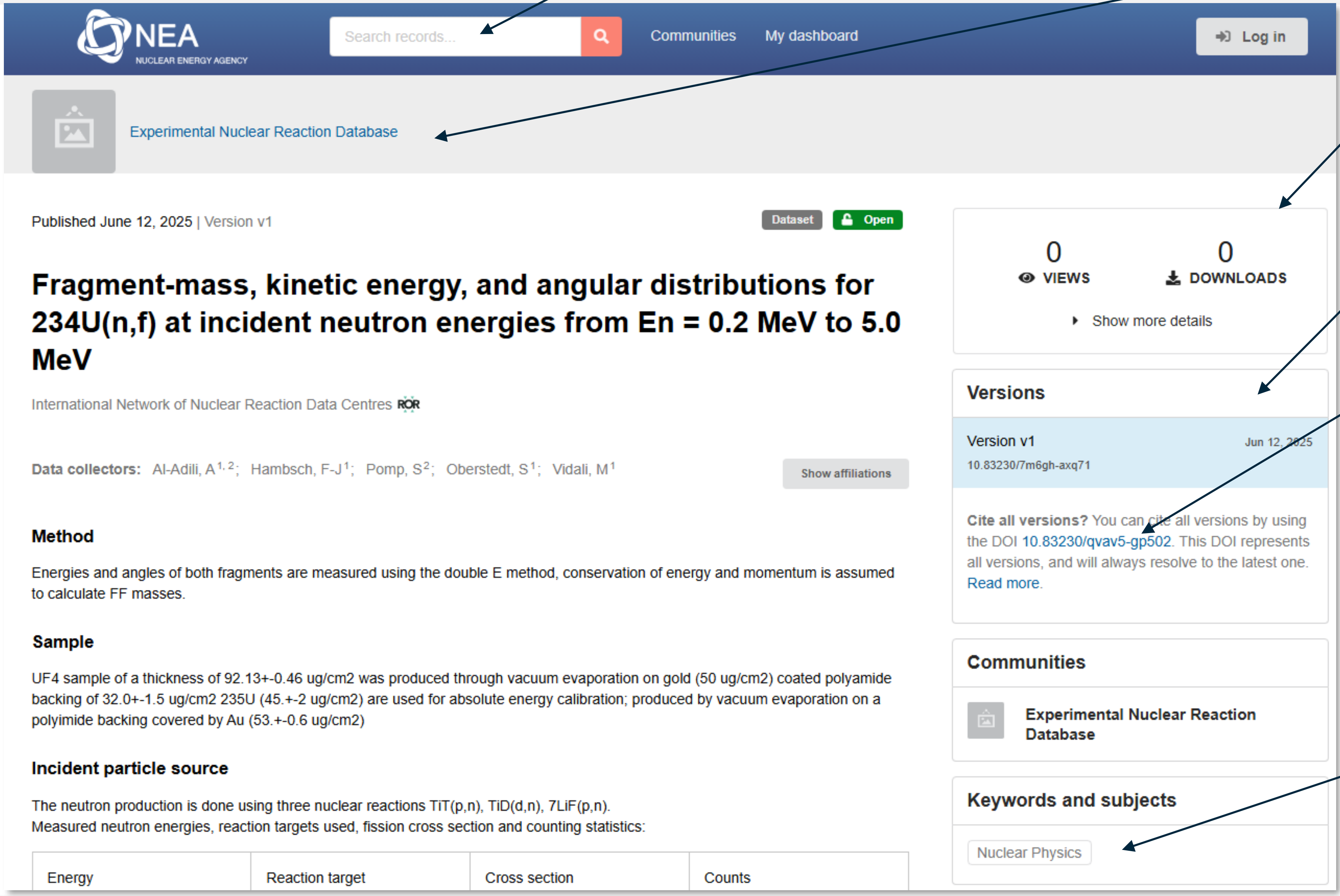
Community reference

Usage statistics

Release versions

Concept reference

Categorization


NEA NUCLEAR ENERGY AGENCY

Search records...

Communities My dashboard

Log in

Experimental Nuclear Reaction Database

Published June 12, 2025 | Version v1

Dataset Open

Fragment-mass, kinetic energy, and angular distributions for 234U(n,f) at incident neutron energies from En = 0.2 MeV to 5.0 MeV

International Network of Nuclear Reaction Data Centres ROR

Data collectors: Al-Adili, A[1, 2]; Hambsch, F-J[1]; Pomp, S[2]; Oberstedt, S[1]; Vidali, M[1]

Show affiliations

Method

Energies and angles of both fragments are measured using the double E method, conservation of energy and momentum is assumed to calculate FF masses.

Sample

UF4 sample of a thickness of 92.13+-0.46 ug/cm2 was produced through vacuum evaporation on gold (50 ug/cm2) coated polyamide backing of 32.0+-1.5 ug/cm2 235U (45.+-2 ug/cm2) are used for absolute energy calibration; produced by vacuum evaporation on a polyimide backing covered by Au (53.+-0.6 ug/cm2)

Incident particle source

The neutron production is done using three nuclear reactions TiT(p,n), TiD(d,n), 7LiF(p,n).
Measured neutron energies, reaction targets used, fission cross section and counting statistics:

Energy	Reaction target	Cross section	Counts

0 VIEWS

0 DOWNLOADS

Show more details

Versions

Version v1 Jun 12, 2025

10.83230/7m6gh-axq71

Cite all versions? You can cite all versions by using the DOI 10.83230/qvav5-gp502. This DOI represents all versions, and will always resolve to the latest one. Read more.

Communities

Experimental Nuclear Reaction Database

Keywords and subjects

Nuclear Physics

Example Data Entry

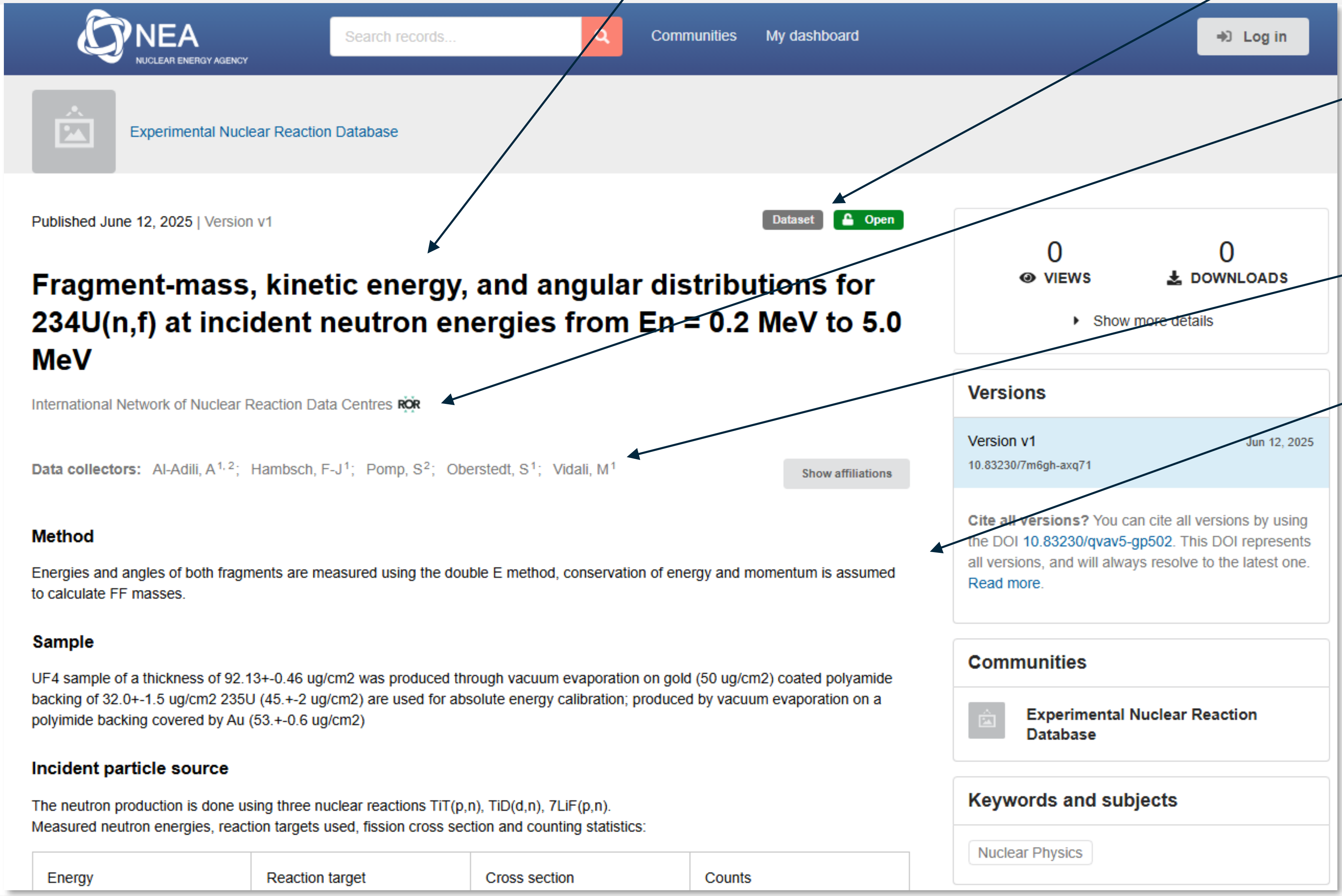
Record title

Record type & status

Publisher

Data Contributors

Entry Header



NEA NUCLEAR ENERGY AGENCY

Search records...

Communities My dashboard

Log in

Experimental Nuclear Reaction Database

Published June 12, 2025 | Version v1

Dataset Open

Fragment-mass, kinetic energy, and angular distributions for 234U(n,f) at incident neutron energies from En = 0.2 MeV to 5.0 MeV

International Network of Nuclear Reaction Data Centres ROR

Data collectors: Al-Adili, A [1, 2]; Hambsch, F-J [1]; Pomp, S [2]; Oberstedt, S [1]; Vidali, M [1]

Show affiliations

Method

Energies and angles of both fragments are measured using the double E method, conservation of energy and momentum is assumed to calculate FF masses.

Sample

UF4 sample of a thickness of 92.13+-0.46 ug/cm2 was produced through vacuum evaporation on gold (50 ug/cm2) coated polyamide backing of 32.0+-1.5 ug/cm2 235U (45.+-2 ug/cm2) are used for absolute energy calibration; produced by vacuum evaporation on a polyimide backing covered by Au (53.+-0.6 ug/cm2)

Incident particle source

The neutron production is done using three nuclear reactions TiT(p,n), TiD(d,n), 7LiF(p,n).
Measured neutron energies, reaction targets used, fission cross section and counting statistics:

Energy	Reaction target	Cross section	Counts

0 VIEWS

0 DOWNLOADS

Show more details

Versions

Version v1 Jun 12, 2025

10.83230/7m6gh-axq71

Cite all versions? You can cite all versions by using the DOI 10.83230/qvav5-gp502. This DOI represents all versions, and will always resolve to the latest one. Read more.

Communities

Experimental Nuclear Reaction Database

Keywords and subjects

Nuclear Physics

Example Data Entry

Incident particle source

The neutron production is done using three nuclear reactions TiT(p,n), TiD(d,n), 7LiF(p,n).
Measured neutron energies, reaction targets used, fission cross section and counting statistics:

Energy	Reaction target	Cross section	Counts
MeV	tickness, ug/cm^2	barn	10^3
0.200+-0.066	LI7F(p,n) 830	0.06	17
0.350+-0.057	LI7F(p,n) 830	0.20	20
0.500+-0.052	LI7F(p,n) 830	0.51	161
(+-0.039)	(619)		
0.640+-0.035	LI7F(p,n) 596	0.84	444
0.770+-0.033	LI7F(p,n) 596	1.20	182
0.835+-0.034	LI7F(p,n) 596	1.22	92
0.900+-0.032	LI7F(p,n) 596	1.14	80
(+-0.033)	(619)		
1.000+-0.111	TiT(p,n) 1936	1.10	155
1.500+-0.093	TiT(p,n) 1930	1.37	406
(+-0.094)	(1936)		
(+-0.103)	(2130)		
2.000+-0.081	TiT(p,n) 1930	1.52	895
(+-0.082)	(1936)		
(+-0.089)	(2130)		

Keywords and subjects

Nuclear Physics

Details

DOI
DOI 10.83230/7m6gh-axq71

Resource type
Dataset

Publisher
NRDC

Languages
English

Rights

Creative Commons Attribution 4.0 International

Citation

International Network of Nuclear Reaction Data Centres. (2025). Fragment-mass, kinetic energy, and angular distributions for 234U(n,f) at incident neutron energies from En = 0.2 MeV to 5.0 MeV [Data set]. NRDC. https://doi.org/10.83230/7m6gh-axq71

Style APA

Export

JSON Export

License

Citation

Metadata export

Example Data Entry

Files

23164.txt

```
ENTRY          23164   20240804                             2320
SUBENT      23164001   20240804                             2320
BIB               15        140
TITLE        Fragment-mass, kinetic energy, and angular
             distributions for 234U(n,f) at incident neutron
             energies from En = 0.2 MeV to 5.0 MeV
AUTHOR      (A.Al-Adili,F.-J.Hambsch, S.Pomp, S.Oberstedt,M.Vidali)
INSTITUTE   (2ZZZGEL) F.-J.Hambsch,A.Al-Adili,S.Oberstedt,M.Vidali
            (2SWDUPP) S.Pomp
REFERENCE   (J,PR/C,93,034603,2016)
            #doi:10.1103/PhysRevC.93.034603
             First author A.Al-Adili,
             corresponding author F.-J.Hambsch
             Received 19.08.2015,published 03.03.2016
            (J,EPJ/CS,21,08001,2012)  Prelim. results; figures only
            #doi:10.1051/epjconf/20122108001
            (J,PPRC,31,158,2012) First author A.Al-Adili.
            #doi:10.1016/j.phpro.2012.04.021
             Indication of anisotropic TKE and mass emission in
            234U(n,f)   Figures only.
            (J,PR/C,86,054601,2012) First author A.Al-Adili.
            #doi:10.1103/PhysRevC.86.054601
            Impact of prompt-neutron corrections on final
            fission-fragment distributions. Preliminary data. All
            data excluded from the Entry according author's request
```

Files (375.2 kB)

Name	Size	Download all
23164.txt md5:84e5a2065787f67d3ebf5bb4129c8725	375.2 kB	Preview Download

Additional details

Related works

Cites
Journal article: 10.1103/PhysRevC.86.054601 (DOI)

Is derived from
Journal article: 10.1051/epjconf/20122108001 (DOI)
Journal article: 10.1016/j.phpro.2012.04.021 (DOI)
Journal article: 10.1016/j.nds.2014.08.094 (DOI)
Journal article: 10.1016/0029-5582%2865%2990139-2 (DOI)

Is part of
Dataset: 10.83230/t76hm-mtf45 (DOI)

Is variant form of
Journal article: 10.1103/PhysRevC.93.034603 (DOI)

Dates

Available
2024-08-04
Publication

File preview

File checksum

File metadata

Manual download

References

EXFOR Main Record

Original Article

EXFOR Main Record

Published May 2, 2024 | Version 2024.3.1

Dataset | Open

EXFOR

Network of Nuclear Reaction Data Centres (NRDC)

Contributors

Hosting institution: Network of Nuclear Reaction Data Centres (NRDC)

The experimental nuclear reaction database, known as EXFOR stores nuclear reaction data and its' bibliographic information, as well as experimental information about the data. The status (e.g., the source of the data), and history (e.g., date of last update) of the data set is also included.

The data presently included in the EXFOR databases include:

- a "complete" compilation of experimental neutron-induced reaction data,
- a selected compilation of charged-particle-induced reaction data,
- a selected compilation of photon-induced reaction data.

Files

Files (333.7 MB)

Name	Size	Download all
exfor.tar.gz md5:9ada64e6cc895315b697bded6f4b5683	333.7 MB	Download

Additional details

Related works

Is described by
Journal article: 10.1016/j.nds.2014.07.065 (DOI)

Software

Repository URL
https://git.oecd-nea.org/exfor/exfor-main

Development Status
Active

References

- https://www-nds.iaea.org/nrdc/about/about-exfor.html

1K VIEWS

119 DOWNLOADS

Show more details

Versions

Version	Date
Version 2024.3.1 10.5072/zenodo.51308	May 2, 2024
Version 2024.3.0 10.5072/zenodo.50885	May 1, 2024
Version 2024.2.0 10.5072/zenodo.50830	May 1, 2024
Version 2023.1.2 10.5072/zenodo.50777	May 1, 2024
Version 2024.1.1 10.5072/zenodo.50725	May 1, 2024

View all 15 versions

Cite all versions? You can cite all versions by using the DOI 10.5072/zenodo.48818. This DOI represents all versions, and will always resolve to the latest one. Read more.

External resources

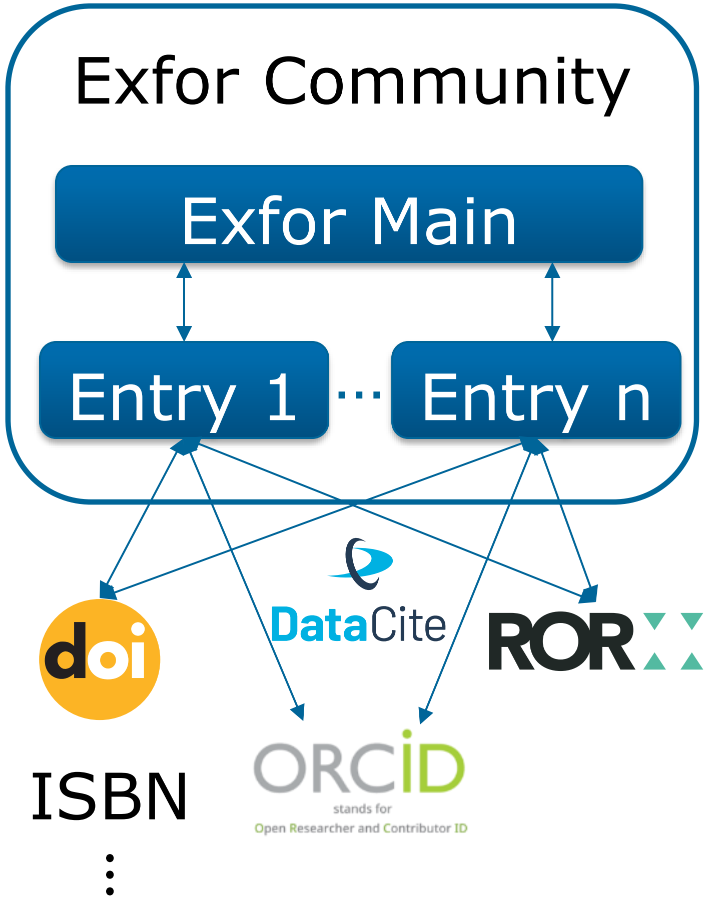
Indexed in

OpenAIRE

Communities

NRDC

Details



DataCite Relation Types

- IsCitedBy
- Cites
- IsSupplementTo
- IsSupplementedBy
- IsContinuedBy
- Continues
- Describes
- IsDescribedBy
- HasMetadata
- IsMetadataFor
- HasVersion
- IsVersionOf
- IsNewVersionOf
- IsPreviousVersionOf
- IsPartOf
- HasPart
- IsPublishedIn
- IsReferencedBy
- References
- IsDocumentedBy
- Documents
- IsCompiledBy
- Compiles
- IsVariantFormOf
- IsOriginalFormOf
- IsIdenticalTo
- IsReviewedBy
- Reviews
- IsDerivedFrom
- IsSourceOf
- IsRequiredBy
- Requires
- Obsoletes
- IsObsoletedBy
- IsCollectedBy
- Collects
- IsTranslationOf
- HasTranslation

https://datacite-metadata-schema.readthedocs.io/en/4.6/appendices/appendix-1/relationType

DataCite Contributor Types

ContactPerson
DataCollector
DataCurator
DataManager
Distributor
Editor
HostingInstitution
Producer
ProjectLeader
ProjectManager
ProjectMember
RegistrationAgency
RegistrationAuthority
RelatedPerson
Researcher
ResearchGroup
RightsHolder
Sponsor
Supervisor
Translator
WorkPackageLeader
Other

https://datacite-metadata-schema.readthedocs.io/en/4.6/appendices/appendix-1/contributorType

Further updates and outlook

Implemented

NRDC has a ROR identifier: https://ror.org/00e50mf91

JEFF is in the process of registering a ROR identifier [ROR Issue #20908]

Upcoming

NRDC / Exfor Community on NEA Data Platform

Systematic relationship tracking, attribution and acknowledgement using DataCite relations and persistent identifiers (DOI, ORCID, ROR,…)

EXFOR entries queryable via Invenio REST API

Metadata queryable also via DataCite REST API

Thank you!

For further questions contact
julia.sprenger@oecd-nea.org

Example Data Entry – Extended Description

Detector

Twin Frisch-grid ionization chamber using both analogue and digital data acquisition techniques. Twin Frisch Grid Ionization Chamber (TFGIC) with two anodes, two grids and a common cathode. As counting gas P10 (90% Argon, 10% Methane) is used in continuous flow 0.1 l/min, at gas pressure 1.05*10**5 Pa.

Assumed Values

235U(nth,f) <TKE>=170.5+/-0.5 MeV for pulse height defect correction following Hambsch et al.(1995).
235U(nth,f) <AH>=139.6+/-0.1 for pulse height defect correction following Hambsch et al.(1995).

Analysis

'2E method' was applied.
The final data analysis was mainly done for the digital system, due to its superiority over the analogue data.

Corrections

- Energy-loss correction.
- Pulse-height defect correction.
- Correction for neutron emission by parameterization of NU dependence from mass A as:
  NU234(A)=1/2*(NU235(A)+NU233(A), where NU for U235 and U233 thermal neutron fission are used - see REL-REF of C.Wahl; for NU dependence from TKE - formula (5) in J,PR/C,93,034603,2016 was used; linear interpolation to the neutron data from REL-REF of D.Mather+ was done to estimate the total neutron emission as a function of incident-neutron energy.

Additional Results

The measured two-dimensional mass yield and TKE distribution have been described in terms of fission modes. The yield of the standard 1 (S1) mode shows fluctuations in the threshold of the fission cross section due to the influence of the resonance and levels off at about 20% yield for higher incident neutron energies. The S2 mode shows the respective opposite behavior. The mean TKE of both modes decreases with En. The decrease in mean TKE overrules the increase in S1 yield, so the mean TKE is dropping as a function of En above 2.5 MeV.Post-neutron-emission kinetic energy of HF as a function of post-neutron-emission mass for En=5MeV is presented

The pre-neutron-emission and post-neutron-emission mass yields for En=5MeV for HF and LF are presented for two methods (see SUBENTs 011 -AV, 012-HV) on fig.6 of J,PR/C,86,054601,2012.

TKE and mean pre-neutron-emission mass as function of total NU for AV method (see SUBENT 011) for EN=5MeV are presented on fig.9a of Phys.Rev.,C86(2012)054601