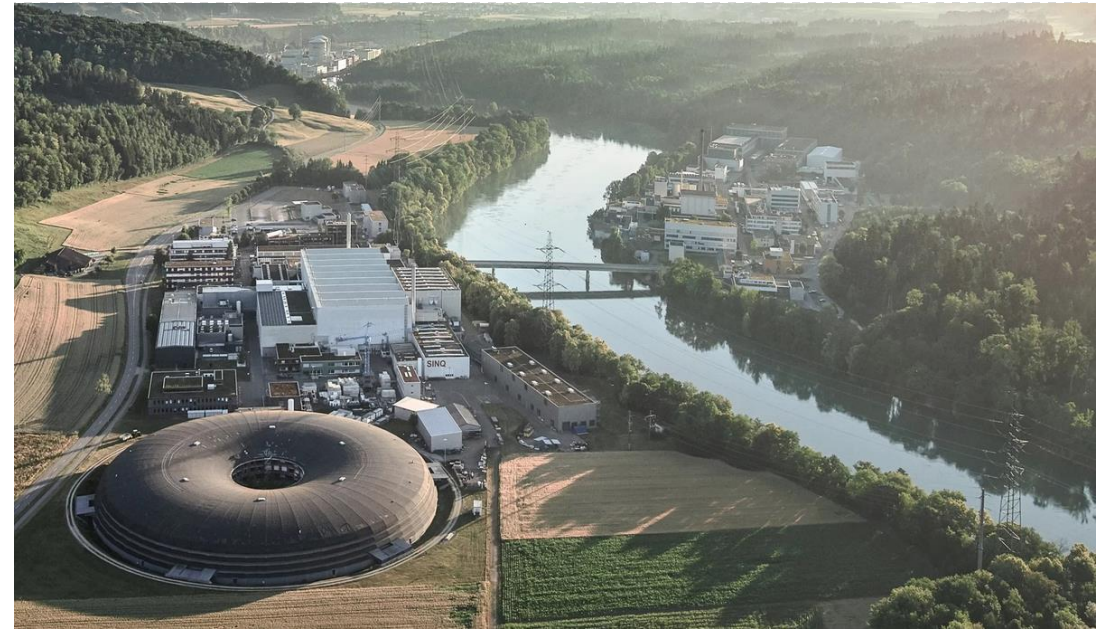**PSI** Center for Nuclear Engineering and Sciences

WP.4: Nuclear data evaluation

D. Rochman

APRENDE kick-off meeting, CIEMAT, Madrid, October 16, 2024

Summary

- General information
- Objectives
- Task efforts
- Description of activities (with deliverables)
- List of deliverables and Milestones
- Links with other WPs and groups

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Project and WP4 general information

PSI

- Project start: October 1st, 2024

- Duration: 48 months (until September 30th, 2028)

- WP4 partners:

  - Task 4.1: USOF (S. Lalkovski)

    Atomki (Z. Elekes)

    INRNE-BAS/USOF (O. Yordanov)

    IFIN-HH (A. Negret)

    CEA-LNHB (M. Kellett)

  - Task 4.2: ESS (I. Marquez)

    JSI (A. Trkov)

    EPFL (M. Hursin)

    CEA (G. Noguere)

    IRSN (V. Jaiswal)

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Project and WP4 general information

- Project start: October 1st, 2024

- Duration: 48 months (until September 30th, 2028)

- WP4 partners:

  - Task 4.3: <u>CEA</u> (O. Serot – G. Kessedjian)

    UPM (O. Cabellos)

    CNRS (L. Giot)

    SCK CEN (A. Stankovskiy)

    IRSN (R. Ichou)

  - Task 4.4: <u>CEA</u> (G. Noguere – C. de St Jean – D. Bernard)   JRC-Geel (A. Plompen)

    NRG (S. van der Marck)   CIEMAT (E. Mendoza)

    PSI (D. Rochman)   UU (H. Sjöstrand)

    JSI (A. Trkov)   UPM (O. Cabellos)

    EPFL (M. Hursin)   SCK CEN (L. Fiorito)

    KIT (A. Konobeev)   UBU (M. Sin)

WP4 objectives

- New evaluations (DD, TSL, FY, XS), in connection with the JEFF needs

- Knowledge self-sustainability

- Ensuring quality, completeness, processing and needs

- Dissemination (NEA, IAEA, CSWEG, publications, presentations)

- Serve EURATOM needs

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WP4 task efforts

- CEA   Task 4.1, 4.2, 4.3, 4.4   34.7 PM   Total: 150.4 PM
- USOF   Task 4.1   24.4 PM
- UBU   Task 4.4   10.4 PM
- PSI   Task 4.4   10.2 PM
- UPM   Task 4.3, 4.4   10.0 PM
- JSI   Task 4.2, 4.4   8.6 PM
- EPFL   Task 4.2, 4.4   8.5 PM
- SCK CEN   Task 4.3,4.4   6.1 PM
- ESS   Task 4.2   5.6 PM
- CIEMAT   Task 4.4   5.4 PM
- Atomki   Task 4.1   4.5 PM
- KIT   Task 4.4   4.4 PM
- IFIN-HH   Task 4.1   3.8 PM
- UU   Task 4.4   3.7 PM
- IRSN   Task 4.2, 4.3   3.6 PM
- NRG   Task 4.4   3.5 PM
- JRC   Task 4.4   3.0 PM

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WP4 Activities

- Task 4.1: Decay data evaluations and education (M1-48)

  - Provide evaluations in ENSDF format (USOF, INRNE-BAS, Atomki and IFIN-HH) for mass chains A=106* and 111

  - D4.1 (evaluations and report)-USOF

- Task 4.2: Thermal scattering data evaluations (M1-36)

  - Subtask 4.2.1: Code development NCrystal (ESS, with the help of CEA, IRSN and EPFL) on Git

  - Subtask 4.2.2: 69 new TSL evaluations for JEFF (ESS, JSI)

  - D4.2 (NCrystal), D4.3 (random TSL tool), D4.4 (TSL evaluations)

- Task 4.3: Fission yield evaluations (M1-48)

  - Subtask 4.3.1: Evaluated FY files for ^{233,235}U, ^{239,241}Pu (thermal and fast) in the ENDF-6 format (CEA)

  - Subtask 4.3.2: Benchmarking (UPM, CEA, CNRS, SCK CEN, IRSN and *CNRS in-kind*)

  - D4.5 (ENDF-6 files), D4.6 (benchmarking report)

* To be discussed: can we change A=106 by A=117 ?

WP4 Activities

- Task 4.4: Cross section evaluations (M1-48)

  - Subtask 4.4.1: Evaluated ENDF-6 files and evaluation tool

  - D4.7 (neutron files ^{233,234}U)-UBU

  - D4.8 (proton files C, Cr, Fe, Co,Ni)-KIT

  - D4.9

    - (neutron files ^{235,238}U, ^{239,240,241}Pu)-CEA

    - (neutron files ^{54,56,57}Fe, ^{90,92}Zr, ^{63,65}Cu)-JSI

  - D4.11

    - (TENDL-2025)-PSI

    - (new TALYS)-IAEA-CEA

  - Subtask 4.4.2: File processing and benchmarking

  - D4.12 (report)-EPFL, with the help of KIT, JSI, SCK CEN, UPM

  - Subtask 4.4.3: Evaluation tool

  - D4.10 (New evaluation tool, applied to Zr)-UU

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WP4 Deliverables & milestones

D4.1	Evaluated files in ENSDF format and report on the nuclear structure data for mass chains A=106 and A=111	WP4	32 - USOF	R — Document, report	PU - Public	42
D4.2	Release of the upgraded NCRYSTAL code with manual	WP4	7 - ESS	OTHER	PU - Public	36
D4.3	Tool for generation of random TSL files and random files	WP4	3 - CEA	OTHER	PU - Public	36
D4.4	TSL evaluation for ZrH and TSL evaluation for the NCrystal database	WP4	14 - JSI	DATA — data sets, microdata, etc	PU - Public	36
D4.5	Thermal fission yield evaluations of 233,235U and 239,241Pu and fast fission yields for 239Pu	WP4	3 - CEA	DATA — data sets, microdata, etc	PU - Public	30
D4.6	Report on the validation of the fission yield libraries (thermal and fast): MYRRHA-like fast systems and thermal systems for decay heat	WP4	3 - CEA	R — Document, report	PU - Public	42
D4.7	New 233U and 234U evaluations	WP4	23 - UBU	DATA — data sets, microdata, etc	PU - Public	36

WP4 Deliverables & milestones

D4.8	Deuteron and proton evaluated cross sections for stable C, Cr, Fe, Co and Ni isotopes	WP4	15 - KIT	DATA — data sets, microdata, etc	PU - Public	47
D4.9	New actinide evaluations for 235U, 238U, 239Pu, 240Pu and 241Pu	WP4	3 - CEA	DATA — data sets, microdata, etc	PU - Public	47
D4.10	New evaluation tool, with a demonstration on Zr	WP4	33 - UU	OTHER	PU - Public	36
D4.11	New TENDL-2025 library and TALYS tools	WP4	3 - CEA	OTHER	PU - Public	36
D4.12	Performance report of the pre-release JEFF-4 library	WP4	37 - EPFL	R — Document, report	PU - Public	46

Milestones:

11	Presentation on the validation of the fission yield libraries	WP4	3 - CEA	Presentation of results in a workshop or meeting	36
12	Presentation on the FY validation for decay heat and uncertainties	WP4	38 - PSI	Presentation on the FY validation for decay heat and uncertainties in a workshop or meeting.	36
13	Presentation of various benchmarks based on new evaluations	WP4	30 - UPM	Presentation of various benchmarks based on new evaluations in a workshop or a meeting.	36

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WP4 Links with other WPs and groups

- Strong link with previous measurements (SANDA and others)
  - Explicitly consider previous measurements in new evaluations

- Strong link with WP2: common WP2-WP4 workshop
  - Increase exchange between evaluations and measurements

- Work for specific applied and "less applied" needs
  - Libraries such as JEFF
  - User needs (energy, astro., others)
  - Code developments for new physics & mathematics, robustness, completeness

- Take advantage of other evaluation efforts
  - Combine efforts (lack of evaluators)
  - IAEA & NEA networks
  - Exchange with other evaluation projects

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Many thanks

- Questions ?

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