PAUL SCHERRER INSTITUT

PSI

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WP.4: Nuclear data evaluation and uncertainties

HORIZON 2020

SANDA kick-off meeting, 9-10 September, 2019, University Foundation club, Brussels, Belgium

Zertifiziertes Managementsystem STARS ISO 9001

Summary

- Description of activities
- Commitments
- Deliverables
- Milestones, dates
- Institutions, laboratories
- Efforts
- Actions

WP.4: overall goals

1. Continue the development of open-source evaluation tools (reactions, decay, structure)

2. Perform evaluations on important isotopes (link with WP.2)

3. Provide processed data for application

4. Provide sensitivity vectors for feedback analysis

5. Link with WP.5 for recommendations on validation

WP.4: Description of activities

1. Task 4.1: Nuclear reaction code developments and evaluations (coordinator PSI D. Rochman)

– Partners: CEA/DAM/DIF, CEA/DEN, PSI, CNRS/IPHC, UTW, UB, UU, IRSN

– Subtask 4.1.1: TALYS development

Better modelling (microscopic and phenomenological models)

Better link with GEF

Influence of theoretical descriptions on emitted spectra

– Subtask 4.1.2: Nuclear reaction evaluation

Bayesian inference & model defect

In-depth evaluation

Automation & portability

WP.4: Description of activities

2. Task 4.2: Fission yields, structure and decay data evaluation (coordinator IFIN-HH A. Negret)

– Partners: IFIN-HH, CEA/LNHB, CEA/DEN, CNRS/LPSC, Sofia, Atomki, CNRS/Subatech

– Subtask 4.2.1: Fission yield evaluation

Test model assumptions

Using measured TKE=fct(A,Z)

Link with GEF and FIFRELIN

– Subtask 4.2.2: Structure and decay data evaluation

Based on ENSDF and RIPL

Based on TAGS

Produce covariance for beta decay data

WP.4: Description of activities

3. Task 4.3: Processing and sensitivity
   (coordinator UPM O. Cabellos)

- Partners: CIEMAT, UPM, CNRS/Subatech
- Produce processed files with NJOY/PREPRO
- Produce processed files for SCALE (AMPX) and GEANT4
- Used libraries: JEFF-3.3, ENDF/B-VIII.0 and JENDL-4.0u2

- Review of the tools
- Verifications of the tools, files and covariances

- Applications to calculations (criticality, shielding and SNF)

- Sensitivity and uncertainty propagation

WP.4: Description of activities

4. Task 4.4: Support for Applications
   (coordinator CIEMAT D. Cano-Ott)

   – Partners: UPM, CIEMAT, JSI
   – Link with WP.5
   – Benchmark recommendations (ICSBEP, SINBAD and SFCOMPO)

5. Task 4.5: High-energy model uncertainties
   (coordinator CEA/Saclay S. Leray)

   – Partners: CEA/Saclay, USC
   – Above 20 MeV
   – Propagation of uncertainties from high-energy models and parameters

WP.4: Commitments

1. Task 4.1: New TALYS & EMPIRE, reporting, evaluations RRR+fast
   (Cr, Mo, other FP, Pu, other AC)

2. Task 4.2: Report on “fission yield analysis with FIFRELIN”, ENSDF evaluations, FY evaluations with TAGS

3. Task 4.3: Report on processing, sensitivity to FY

4. Task 4.4: Recommendation of benchmarks and uncertainty propagation

5. Task 4.5: Report on uncertainties due to high-energy models and their parameters

WP.4: Deliverables

Deliverable Number[14]	Deliverable Title	WP number[9]	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D4.1	Report on code development, methods	WP4	21 - PSI	Report	Public	40
D4.2	Report on new nuclear reaction data evaluation	WP4	3 - CEA	Report	Public	48
D4.3	Report on the evaluation for fission yields	WP4	3 - CEA	Report	Public	36
D4.4	Report on the evaluation for nuclear structure and decay data	WP4	10 - IFIN-HH	Report	Public	36
D4.5	Report on the processing and sensitivity analysis	WP4	32 - UPM	Report	Public	36
D4.6	Report on the applications: recommendation	WP4	1 - CIEMAT	Report	Public	36
D4.7	Report on the possibility to generalize the high-energy model uncertainties methodology	WP4	3 - CEA	Report	Public	48

WP.4: Milestones, dates

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS30	availability of TALYS modules	3 - CEA	32	availability of TALYS modules
MS31	availability of new EMPIRE modules/models	26 - UB	32	availability of new EMPIRE modules/models
MS32	availability of evaluated files for important actinide isotopes	3 - CEA	32	availability of evaluated files for important actinide isotopes
MS33	availability of evaluated files for important fission products	3 - CEA	36	availability of evaluated files for important fission products

WP.4: Institutions, efforts

Work package number	WP4			Lead beneficiary		PSI	
Work package title							
Participant number							
Short name of participant	CEA	*PSI*	CNRS	CIEMAT	UU	UTW	UB
Person-months per participant							
EC contribution per participant k€	257.5	99	93.7	70.8	91	52.4	78.4
Participant number							
Short name of participant	UPM	JSI	IFIN-HH	USC	Sofia	Atomki	
Person-months per participant							
EC contribution per participant k€	46	36	20	25	20	20	
Participant number							
Start month	1			End month	48		

WP.4: Actions

Action 1: CEA/DAM/DIF, task 4.1.1, release of TALYS modules.

Action 2: UTW, task 4.1.2, detailed reporting (or journal paper) on the complete evaluation scheme and developed tools.

Action 3: UU, task 4.1.2, release of a code package for treating model defects in the fast energy range.

Action 4: UU, task 4.1.2, release of ENDF-6 evaluations for Cr isotopes.

Action 5: CEA/DEN, task 4.1.2, release of ENDF-6 evaluations for actinides and fission products.

Action 6: PSI, task 4.1.2, release of ENDF-6 evaluations and input files for fission products.

Action 7: CNRS/IPHC, task 4.1.2, provide a new analysis of (n,xng) data in support of full evaluations.

Action 8: UB, task 4.1.2, provide the ENDF-6 evaluations for Pu isotopes.

Action 9: CNRS/LPSC, task 4.2.1, reporting on fission yields analysis with FIFRELIN.

Action 10: CEA/LNHB, task 4.2.2, provide ENSDF evaluations.

Action 11: IFIN-HH, task 4.2.2, provide ENSDF evaluations.

Action 12: Sofia, task 4.2.2, provide ENSDF evaluations.

WP.4: Actions

Action 13: ATOMKI, task 4.2.2, provide ENSDF evaluations.

Action 14: CNRS/Subatech, task 4.2.2, provide a new evaluation with TAGS data.

Action 15: CIEMAT, task 4.3, provide AMPX and GEANT4 processed libraries.

Action 16: UPM, task 4.3, reporting on processing activities.

Action 17: CNRS/Subatech, task 4.3, reporting on sensitivity to fission yields.

Action 18: CIEMAT (with UPM), task 4.4, provide a recommend list of benchmarks.

Action 19: JSI, task 4.4, provide uncertainty analysis for specific benchmarks.

Action 20: CEA/Saclay, task 4.5, reporting on analysis for high energy uncertainties due to models/parameters.

Action 21: USC, task 4.5, reporting on analysis for high energy uncertainties due to models/parameters.