



D. Rochman, M. Hursin

Task PMI-7.4-To03 summary

JEFF/EFF Nuclear Data Tasks PMI-7.4 , via remote connection,
EFF-1433, 24 November 2020

- Task PMI-7.4-T003 Description:

EUROfusion Horizon 2020

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Reviewers
Alessandro Spagnuolo [×](#)
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Description

The following activities will be conducted in 2020:

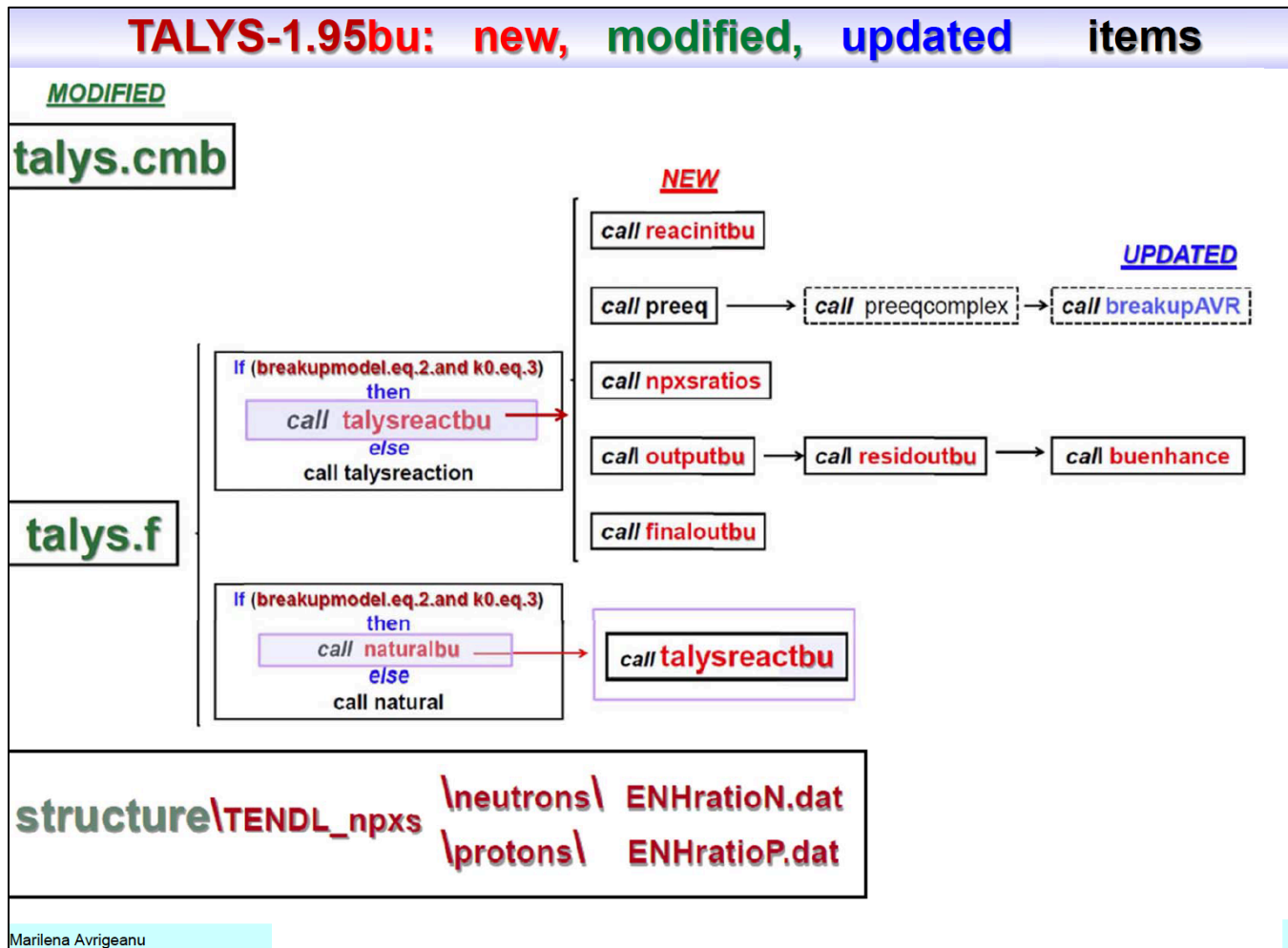
1. Based on the availability of a modified TALYS version provided by IFIN-HH, PSI/EPFL will first test this new version on a list of isotopes suitable for the TENDL library. Based on the results, modifications and changes will be proposed to IFIN-HH and the TALYS developers, the goal being to use such improved TALYS version for the production of the next TENDL library.

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1. Based on the availability of a modified TALYS version provided by IFIN-HH, PSI/EPFL will first test this new version on a list of isotopes suitable for the TENDL library. Based on the results, modifications and changes will be proposed to IFIN-HH and the TALYS developers, the goal being to use such improved TALYS version for the production of the next TENDL library.

Actions in 2020

- April 2020: M. Avrigeanu has sent the updated TALYS subroutines based on TALYS-1.95, including the option “breakupmodel 2”



- May-July 2020: D. Rochman performing test of the new TALYS for a number of isotopes. Example for Sn122:

```

1 #
2 # TALYS input file generated by Autotalys
3 #
4 projectile d
5 element Sn
6 mass 122
7 Ltarget 000
8 energy energies
9 maxlevelstar 30
10 partable y
11 bins 40
12 #
13 # Use best parameters from database
14 #
15 best y
16 #
17 # Produce files for processing into ENDF and increase required precision
18 #
19 endf y
20 endfdetail y
21 popeps 1.e-12
22 transeps 1.e-20
23 transpower 15
24 xseps 1.e-20
25 #
26 # Output of extra channels
27 #
28 channels y
29 filechannels y
30 spherical y
31 #
32 # Use better OMP for incident deuterons
33 #
34 deuteronomp 4
35 #
36 # Recoils
37 #
38 recoil y
39 recoilaverage y
40 #
41 # Specific addition for EAF files
42 #
43 isomer 0.1
44 maxchannel 8
45 #
46 # Specific keywords added through external TALYS files
47 #
48 deuteronomp 2
49 outpreequilibrium y
50 filetotal y
51

```

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36 # Recoils
37 #
38 recoil y
39 recoilaverage y
40 #
41 # Specific addition for EAF files
42 #
43 isomer 0.1
44 maxchannel 8
45 #
46 # Specific keywords added through external TALYS files
47 #
48 deuteronomp 2
49 outpreequilibrium y
50 filetotal y
51 breakupmodel 2

```



Actions in 2020

- Results presented in terms of residual isotopes. Example for Sn122:
- Difference between total production cross sections:

```
cat ../Sn122-original-d/Sn122/tables/residual/rp049121.tot ../Sn122-modified-d/Sn122/tables/residual/rp049121.tot
```

```
# d + 122Sn: Production of 121In - Total
# Q-value    =-5.90084E+00 mass= 120.907851
# E-threshold= 5.99831E+00
# # energies =    54
```

#	E	xs
1	1.00000E-03	0.00000E+00
2	2.00000E-03	0.00000E+00
5	5.00000E-03	0.00000E+00
1	1.00000E-02	0.00000E+00
2	2.00000E-02	0.00000E+00
5	5.00000E-02	0.00000E+00
1	1.00000E-01	0.00000E+00
2	2.00000E-01	0.00000E+00
5	5.00000E-01	0.00000E+00
1	1.00000E+00	0.00000E+00
2	2.00000E+00	0.00000E+00
3	3.00000E+00	0.00000E+00
4	4.00000E+00	0.00000E+00
5	5.00000E+00	0.00000E+00
6	6.00000E+00	0.00000E+00
7	7.00000E+00	0.00000E+00
8	8.00000E+00	0.00000E+00
9	9.00000E+00	0.00000E+00
1	1.00000E+01	0.00000E+00
1	1.10000E+01	0.00000E+00
1	1.20000E+01	1.70453E-12
1	1.30000E+01	1.47621E-10
1	1.40000E+01	5.95834E-09
1	1.50000E+01	1.38324E-07
1	1.60000E+01	2.10445E-06
1	1.70000E+01	2.19820E-05

Original

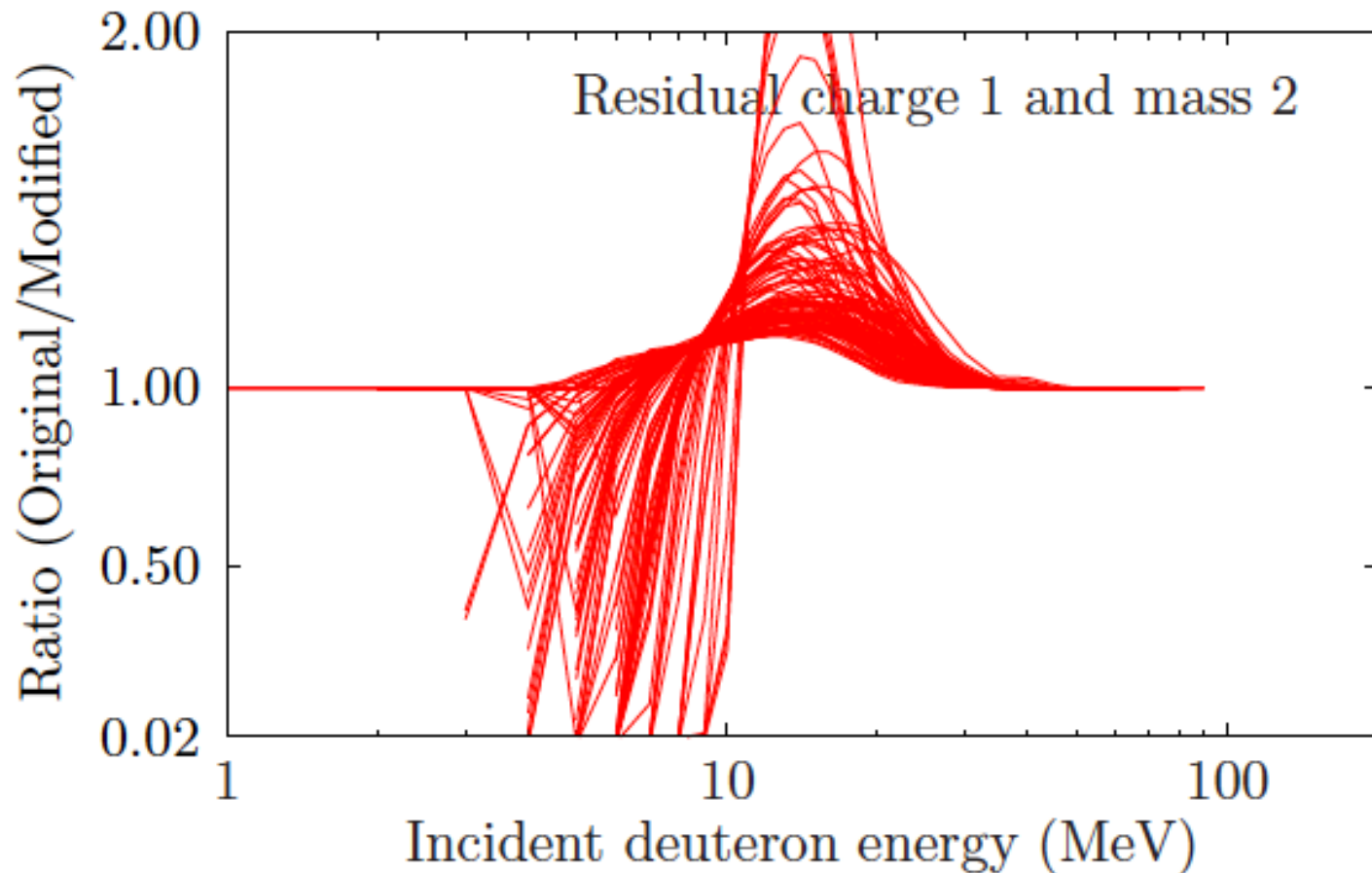
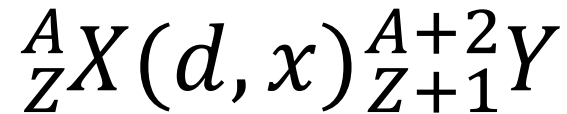
```
# d + 122Sn: Production of 121In - Total
# Q-value    =-5.90084E+00 mass= 120.907851
# E-threshold= 5.99831E+00
# # energies =    54
```

#	E	xs_(d,x)	xs_BF	xs_SUM
1	1.00000E-03	0.00000E+00		
2	2.00000E-03	0.00000E+00		
5	5.00000E-03	0.00000E+00		
1	1.00000E-02	0.00000E+00		
2	2.00000E-02	0.00000E+00		
5	5.00000E-02	0.00000E+00		
1	1.00000E-01	0.00000E+00		
2	2.00000E-01	0.00000E+00		
5	5.00000E-01	0.00000E+00		
1	1.00000E+00	0.00000E+00		
2	2.00000E+00	0.00000E+00		
3	3.00000E+00	0.00000E+00		
4	4.00000E+00	0.00000E+00		
5	5.00000E+00	0.00000E+00		
6	6.00000E+00	0.00000E+00		
7	7.00000E+00	0.00000E+00		
8	8.00000E+00	0.00000E+00		
9	9.00000E+00	0.00000E+00		
1	1.00000E+01	0.00000E+00		
1	1.10000E+01	0.00000E+00		
1	1.20000E+01	1.69956E-12	0.00000E+00	1.69956E-12
1	1.30000E+01	1.47493E-10	0.00000E+00	1.47493E-10
1	1.40000E+01	5.95683E-09	5.39101E-16	5.95683E-09
1	1.50000E+01	1.38314E-07	6.21525E-13	1.38315E-07
1	1.60000E+01	2.10441E-06	1.46423E-10	2.10456E-06
1	1.70000E+01	2.19822E-05	4.07935E-09	2.19863E-05

Modified

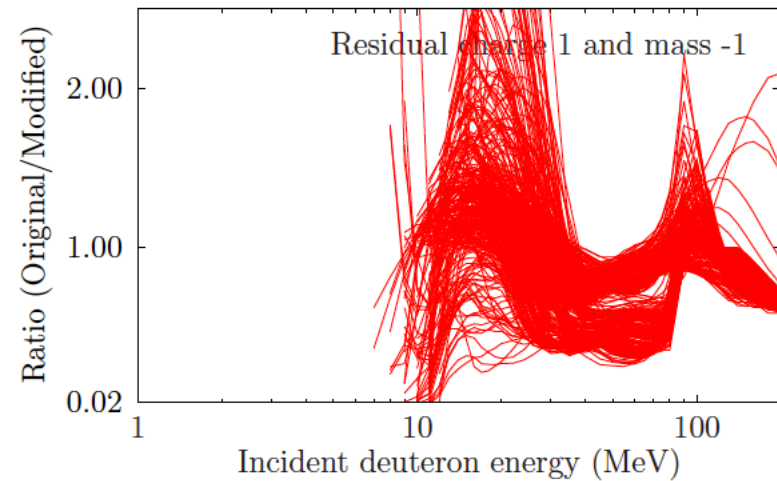
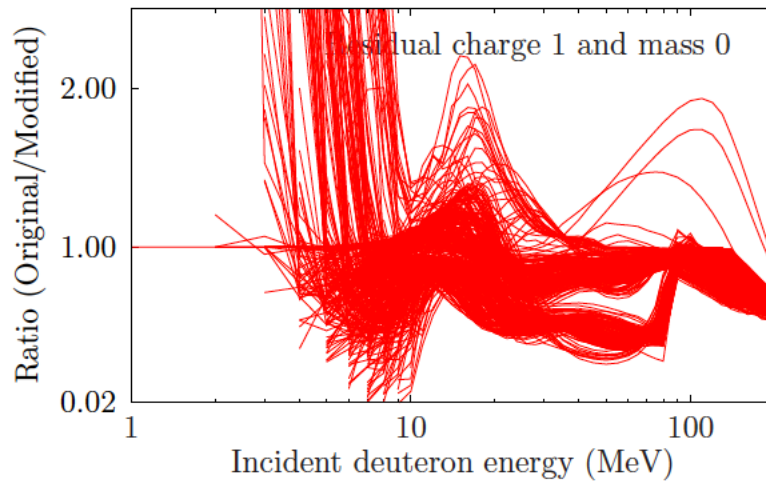
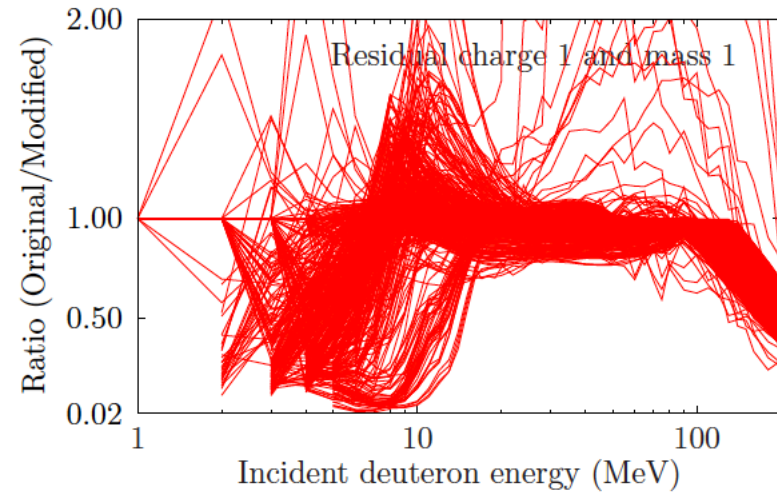
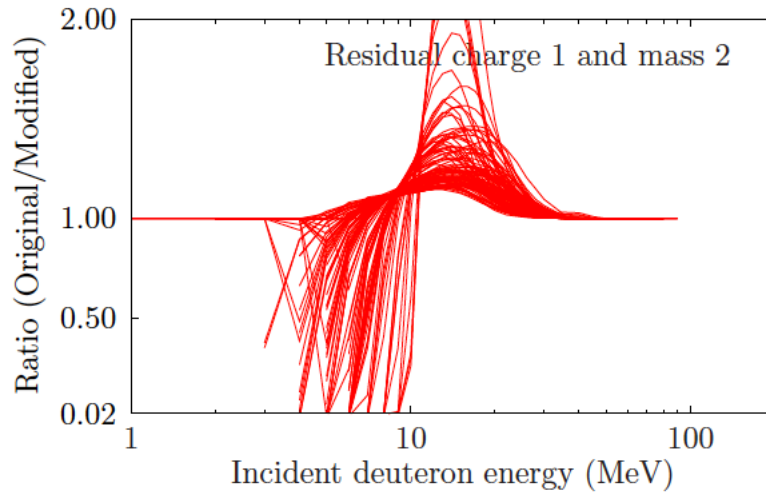
Actions in 2020

- Results presented in terms of residual isotopes.



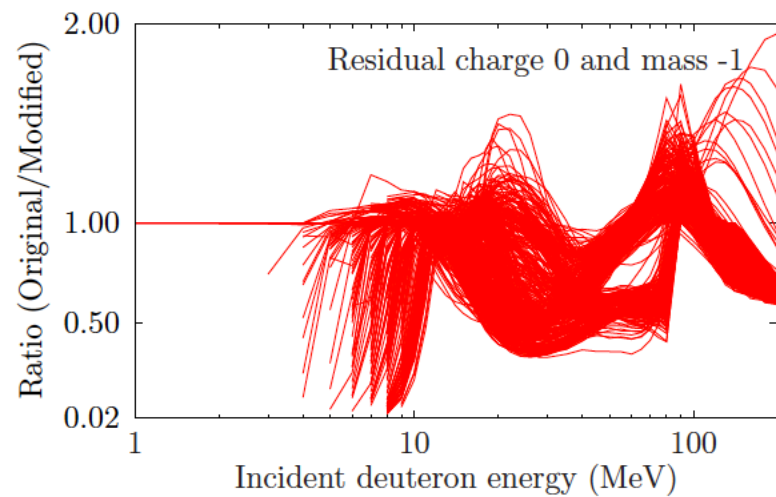
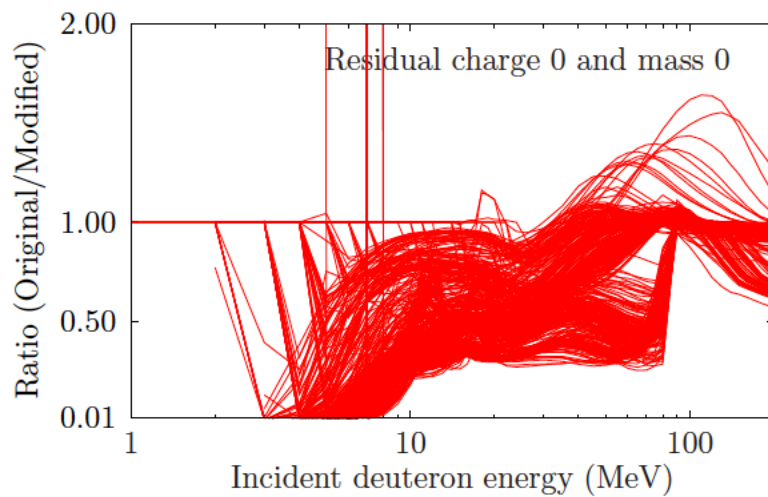
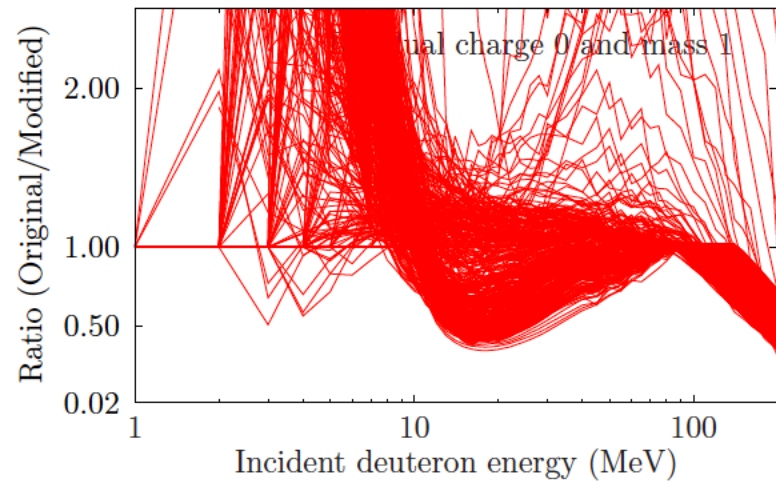
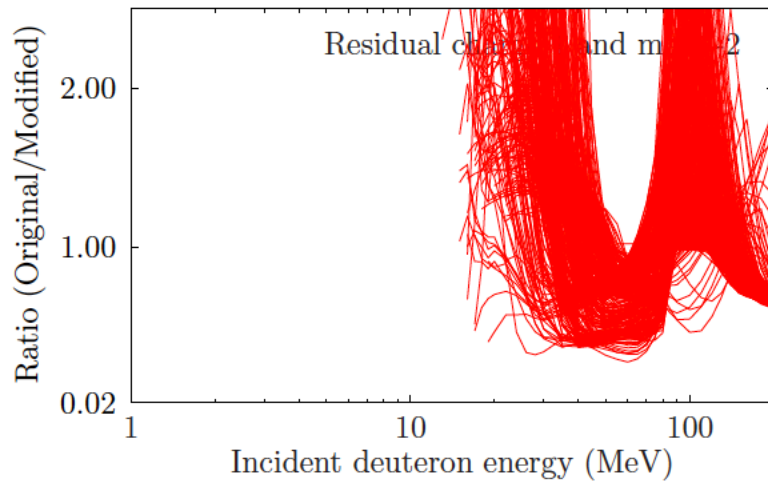
Actions in 2020

- Results presented in terms of residual isotopes.



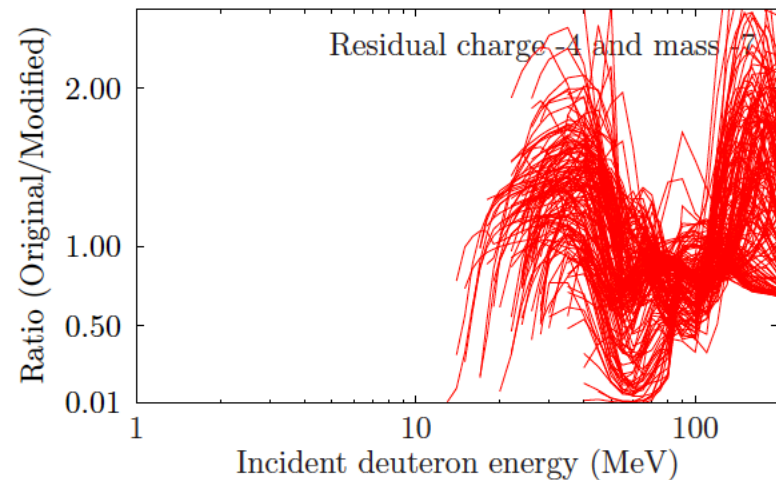
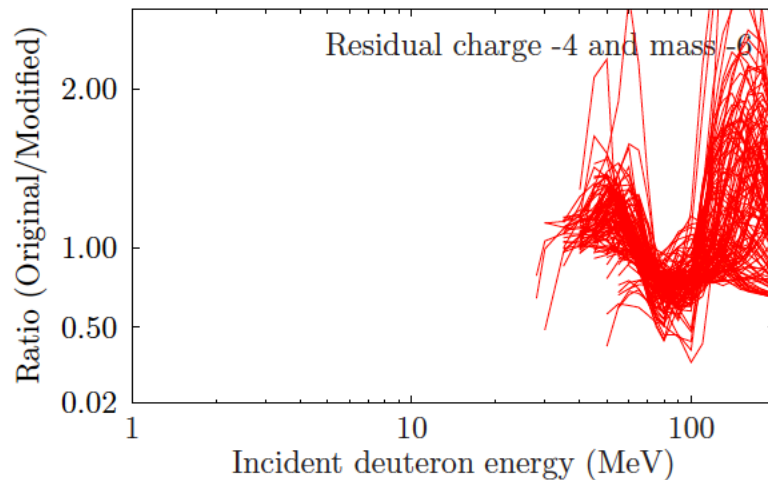
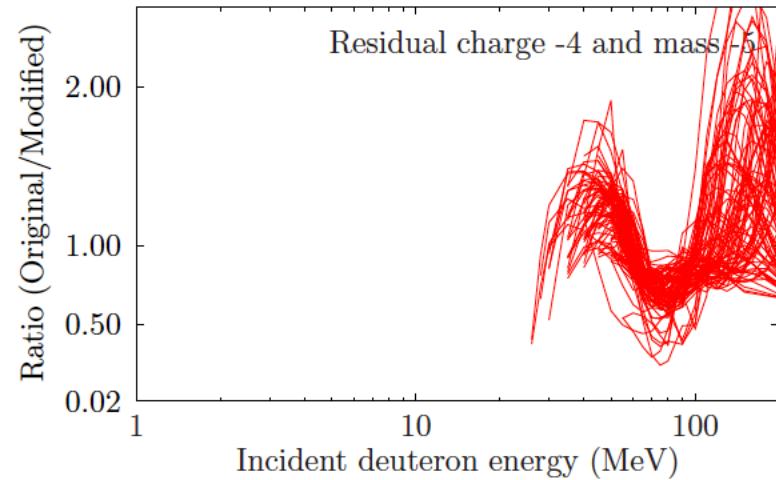
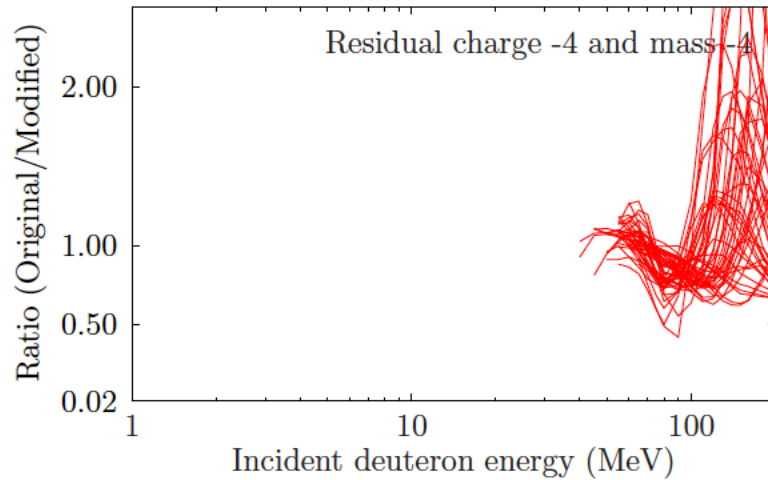
Actions in 2020

- Results presented in terms of residual isotopes.



Actions in 2020

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Conclusions

- New TALYS version delivered and tested.
- TALYS developers are informed.
- Report submitted end of October



EUROfusion

POWER PLANT PHYSICS &
TECHNOLOGY DEPARTMENT

Report IDM reference No. [EFDA D 2NB79P](#)

Version: see IDM

Final Report

on Deliverable(s)

EPFL/PSI contribution to PPPT nuclear data development: Improved deuteron data library



		Deliverable-ID(s)	<i>PMI-7.4-T003-D003</i>
Work Package	<i>WPPMI</i>	Issue Date	<i>26-10-2020</i>
Project Leader	<i>Gianfranco Federici</i>		
TS Title(s)	<i>Improved deuteron data library</i>		
TS Ref. No.(s)	<i>PMI-7.4-T003</i>		
Task Owner(s)	<i>Dieter Leichtle</i>		
RU(s)	<i>EPFL</i>		

Report Review & Approval	
IDM role	Name(s)
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