The EAF-97 Library

The European Activation File
1997 Version

EAF-97 = JEFF-3.0/A

J-Ch Sublet, J Kopecky and A Simpson
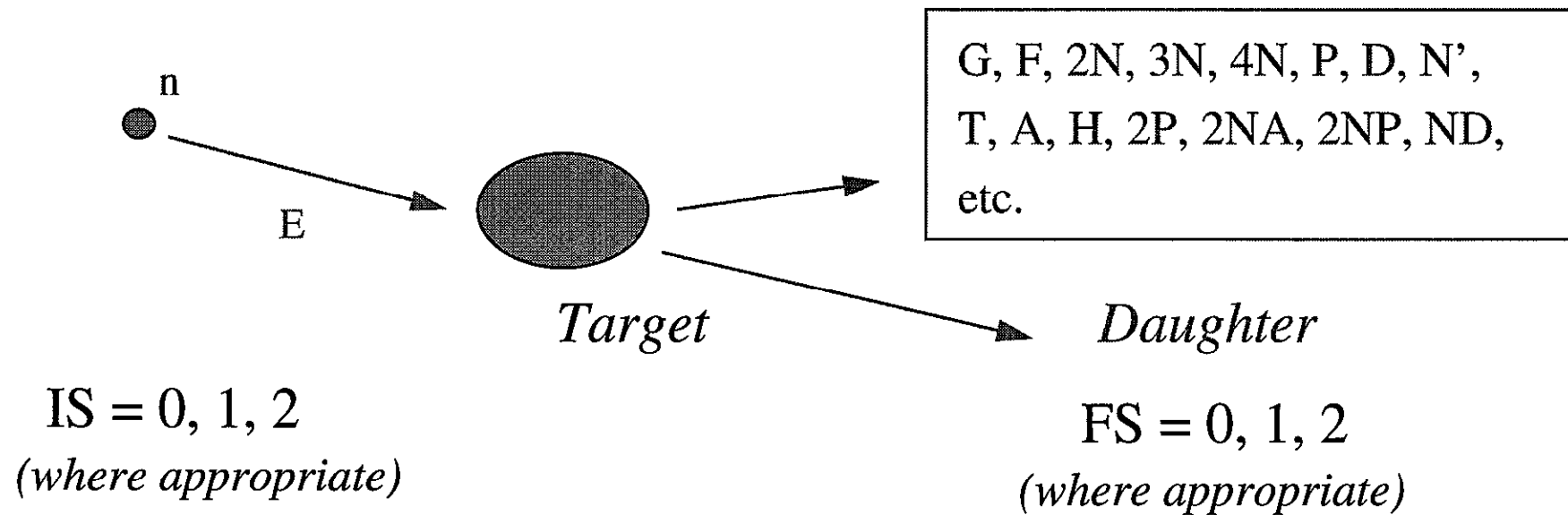
UKAEA

Fusion

Background

- ◆ EAF compilation responsibilities moved from Petten to UKAEA in late 1995

- ◆ The EAF processing code SYMPAL has been updated and modified at UKAEA leading to SYMPAL-96

- ◆ The library EAF-4.1 (July 1995) + the 200 FENDL/A-2.0 selected reactions form the backbone of EAF-97

UKAEA

Fusion

EAF-97 evolution

◆ Selection of evaluations and isomeric branching ratios (Kopecky, Sowerby)

◆ Selection of new evaluations in JENDL-3.2/A (1342 reactions), IRK and JAERI (Actinides)

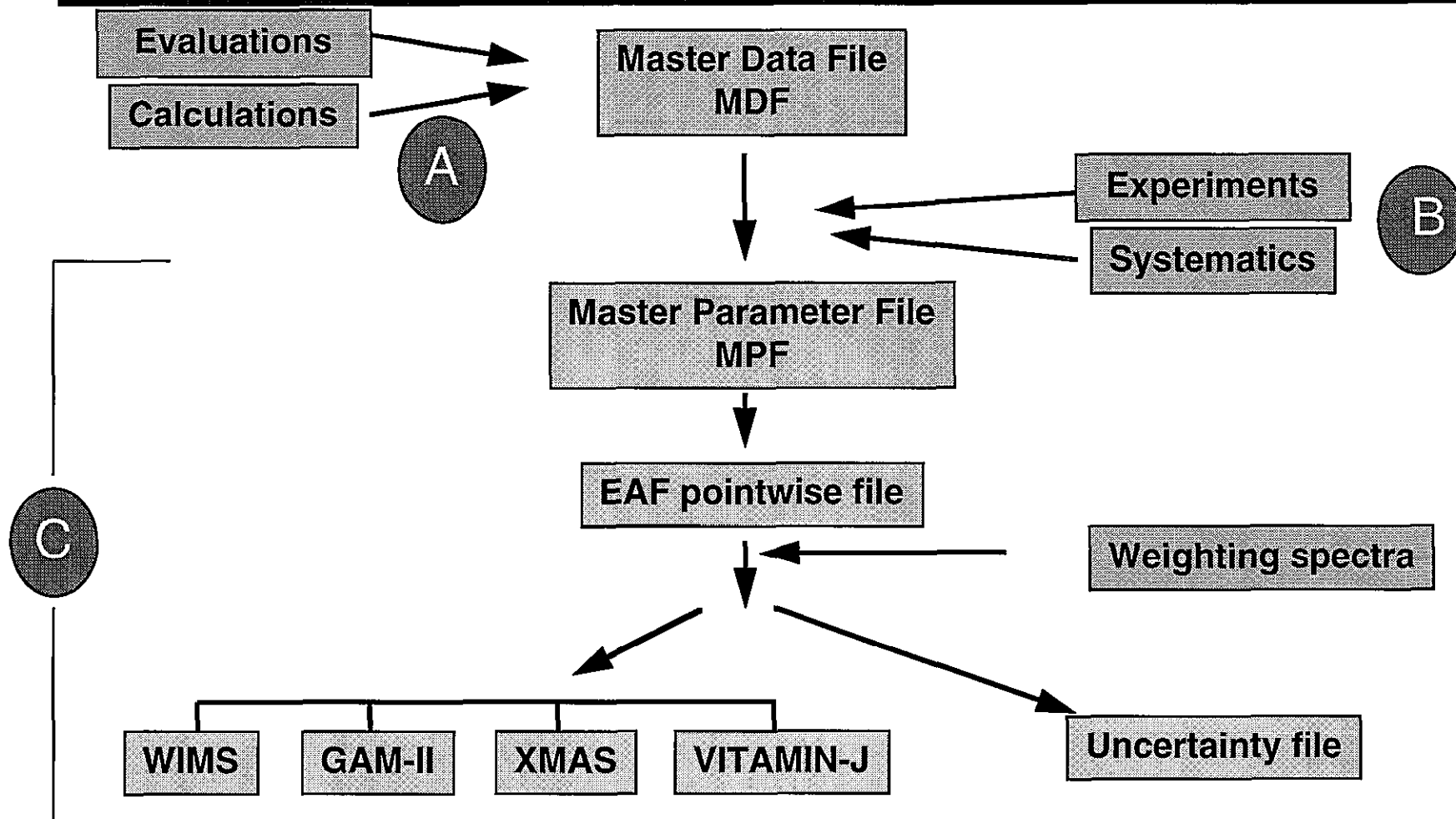◆ Correction of wrong excitation profiles: 95 (n,g), (n,f) + 18 direct captures added (PEQ)

All reactions can now be visualised using WAVE routines and compared, plotted with experimental data

EAF-97 Reaction Channels

n

E

Target

IS = 0, 1, 2

(where appropriate)

> G, F, 2N, 3N, 4N, P, D, N',
> T, A, H, 2P, 2NA, 2NP, ND,
> etc.

Daughter

FS = 0, 1, 2

(where appropriate)

Inelastic data only, hence for N,N' IS≠FS

UKAEA

Fusion

SYMPAL-96 Processing

Fusion

SYMPAL: Stages A and B

A. *Prepare new evaluated or calculated data for the MDF*

- reformat (eg from JENDL3.2/A, IRK, ADL) to EAF format

- sort into EAF order

- merge or replace into MDF to form a new one

Tested and working on the IBM RS/6000

B. *Update the files containing Experimental and Systematic data*

- changes made by a text editor

- take account of new targets

UKAEA
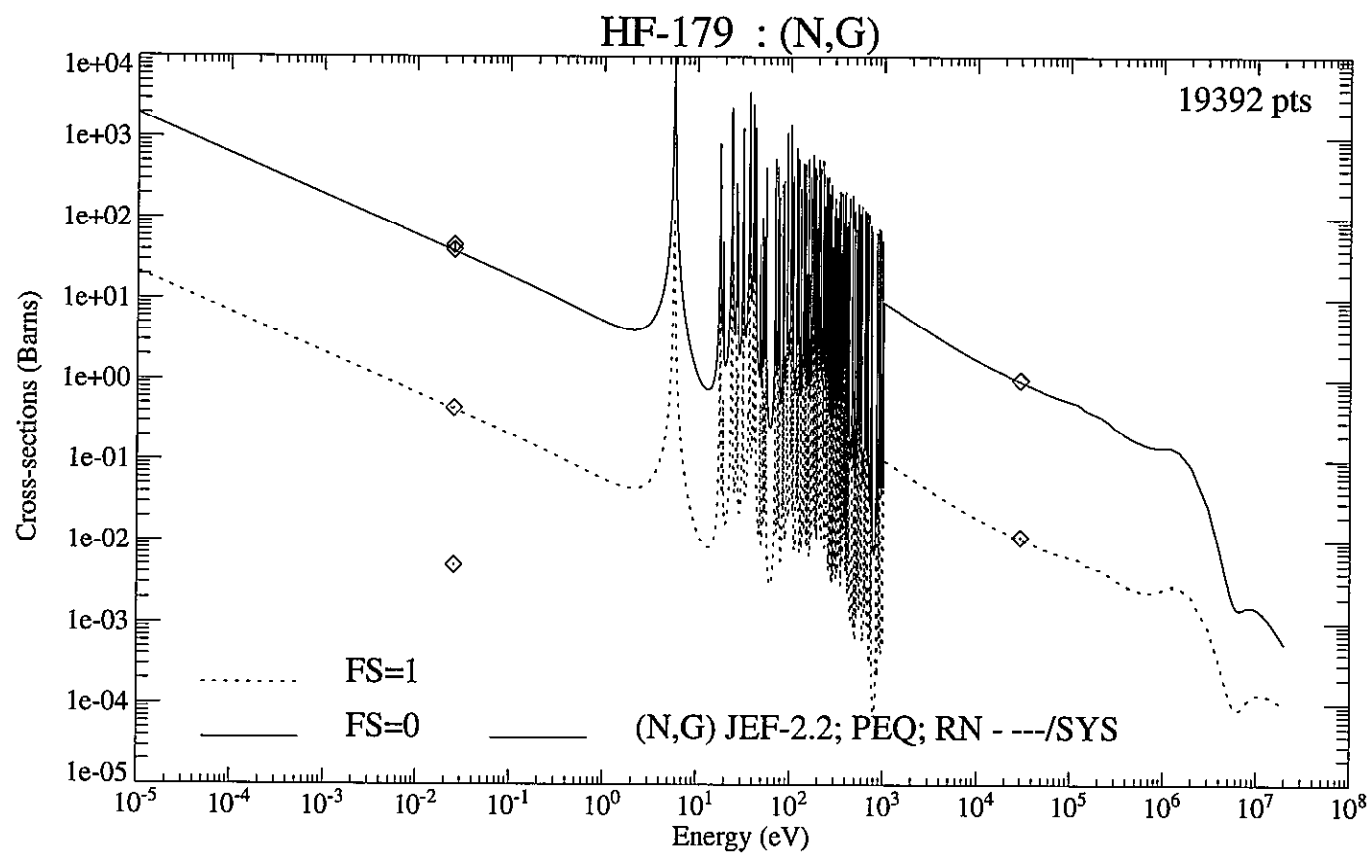
Fusion

SYMPAL: Stage C

C. *Processes the MDF and EXP+SYS data to produce data in various formats:*

- produces MPF, REPORT, DIST files

- generates groupwise files

- gives validation tables

- generates uncertainties

- performs some counting of reactions and data source

UKAEA

Plotting the data

- Make a subset of the point-wise file containing the reactions of interest

- Split into one file per target isotope and reaction, then plot using WAVE

- Allows detailed checks of the data - currently the (n,γ) reaction channels have been studied in detail and compared with experimental data

UKAEA

Fusion

EAF-97 plot

HF-179 : (N,G)

Cross-sections (Barns) vs Energy (eV)

19392 pts

.... FS=1

———— FS=0   ———— (N,G) JEF-2.2; PEQ; RN - ---/SYS

EAF-97 Reactions

Reaction type	Number of reaction
N,2N	1001
N,3N	858
N,4N	21
N,G	1002
N,F	88
N,N	256
N,ND	989
N,NP	986
N,NA	963
N,NT	906
N,NH	329
N,2P	872
N,2A	2
N,P	982
N,D	989
N,A	954
N,T	1010
N,H	914
N,2NA	2
N,2NP	1
N,N2A	1
Total	13126

◆ Reactions on all isomeric states (IS = 0, 1, 2 and FS = 99, 0, 1, 2)

◆ For comparison:
  - JEF-2.2 = 2204
  - ENDF/B-VI = 1342

UKAEA

Fusion

EAF-97 Origin

Data Source	Number of reactions
JEF-2.2	2100
EFF-2.4	515
ENDF/B-VI	60
JENDL-3.1	170
JENDL-3.2	5
JENDL-3.2/A	81
ACTL	2
LANL	6
ADL-3	8535
FISPRO	9
SIGECN-MASGAM	73
MASGAM	411
NGAMMA	14
THRES	753
EXIFON	283
SIG-ECN	1
IRDF-90.2	22
ESTIMATE	35
CRP	9
FENDL/A-1	41
IRK	1
Total	13126

◆ From the element H (A=1) to Fm (A=100)

◆ 766 target isotopes

◆ For comparison:
- JEF-2.2 = 298
- B-VI = 303

UKAEA

Fusion

EAF-97 renormalisation

Normalization	
"RN - EXP/..."	87
"RN - SYS/..."	498
"RN - .../EXP"	158
"RN - .../SYS"	2341
"RN - EXP/---"	47
"RN - SYS/---"	479
"RN - ---/EXP"	142
"RN - ---/SYS"	2298
"RN - EXP/EXP"	16
"RN - EXP/SYS"	24
"RN - SYS/SYS"	19
Total	3025

◆ Renormalisation:
- of the excitation function
  - at 0.0253 eV
  - at 30 keV
  - at 14.5 MeV
- of the isomeric branching

◆ ie EXP/...=24+16+47=87

◆ From EXPerimental data

◆ From SYStematics

UKAEA

EAF-97 experimental data base

◆ The experimental data base is composed of a set of ASCII tables at 3 different energies: 0.0253 eV, 30 keV and 14.5 MeV

◆ In total 2963 experimental results have been selected and appear on plots

◆ Only around 1800 of them are really used for renormalisation

◆ NEW : EXFOR data base

UKAEA

Fusion

JEFF-3.0/A

◆ EAF-97 can be used and/or renamed as:

JEFF-3.0/A

◆ The pointwise file in "EAF format" or other agreed formats would be most beneficial to the JEFF project at time when the emphasis is on activation and transmutation related projects.

UKAEA

Fusion