

Comments on Processing of Recent Nuclear Data Libraries with NJOY

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Outline

- **Applications**
- **Nuclear data libraries**
- **NJOY Versions and Modules**
- **Experiences and Patches**



Applications

- **For this presentation we have focused on**
 - *Fusion and intermediate energy applications*
 - ITER/DEMO and IFMIF
 - Incident particles: neutrons and deuterons
 - Incident energies: up to 20/150 MeV
 - *Neutron transport/activation, deuterium transport*

Nuclear Data Libraries

- **EFF3 (Be9 and others)**
 - **JEFF 3.1T (Pb, Ti, Be9)**
 - **JENDL 3.3 (W)**
 - **JENDL-HE (H and others)**
 - **INPE (Be9, Na23, K39, O16, C12 and others)**
 - **FZK d-Li**
 - **IEAF 2001 (many nuclides)**
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- 20 MeV
- 1 GeV
- 50 MeV
- 150 MeV



NJOY99 Versions and Modules

- (1) Official NJOY99.90**
 - (2) NJOY99.90 + IRS patches**
 - (3) NJOY99.50 + patches (for IEAF2001 and EFF3)**
- **BROADR: no patches**
 - **RECONR: some patches (now in up54)**
 - **HEATR: some patches**
 - **GROUPR: major patches**
 - **ACER: major patches**
 - **(NJOY Main) and general: small patches, error handling, output formatting, input records**



Experiences and Patches

- **JENDL-HE**

- *Problem with H1*

- *HEATR*

- Increase of storage (a,elis,term)
 - Check on missing photon production
 - Bug fix: Input record (moreio)

- *ACER*

- Allow for MT208-210 (pion production)

- **Success with (1) (2)**



Experiences and Patches

- **INPE d-Li**

- *Problem with LAW 7 (MT5)*

- *ACER*

- Check on MF6 in combination with LAW 7

- Avoid division by zero when $amu=1$

- **Success with (2)**

- *But very large ACE-file produced (300 MB, after removal of energy points now 50 MB)*



Experiences and Patches

- **JEFF 3.1T Pb**
 - *Problem with normalisation if c.s. is 0*
 - *ACER*
 - Avoid division by zero when $x_{ss}=0$ (renorm)
 - **JEFF 3.1T Ti**
 - **JENDL 3.3 W**
 - *No problems observed*
- **Success with (1) (2)**



Experiences and Patches

- **IEAF 2001**

- *Use of lumped MT5 (neutron, anything)*
- *Cross sections in MF3, particle yield vectors in MF6 (LAW 0)*
- *GROUPE*
 - Use of mfd=2zzzaaam for single nuclide and
 - Mfd=20000000 for all nuclides
 - Bug fix: Input record (moreio)
 - Extensive modifications implemented
 - Full library processed

- **Success with (2) (3)**



Experiences and Patches

- **JEFF 3.1T (EFF3.05) Be9**
 - *Partials of (n,2n) in MT875-890, MF6 (LAW 7) neutrons and alphas*
 - *Two separate neutron distributions in MT876*
 - ACE can only have a single angular distribution, but eventually several secondary energy distributions
 - *RECONR*
 - Add processing of MT875-890 (now in up54)
 - *ACER*
 - Add processing of MT875-890 (n and α)
 - Combine angular distributions and retain LAW 7
 - Bug fixes and increase of storage (xss)

➤ **Success with (3)**

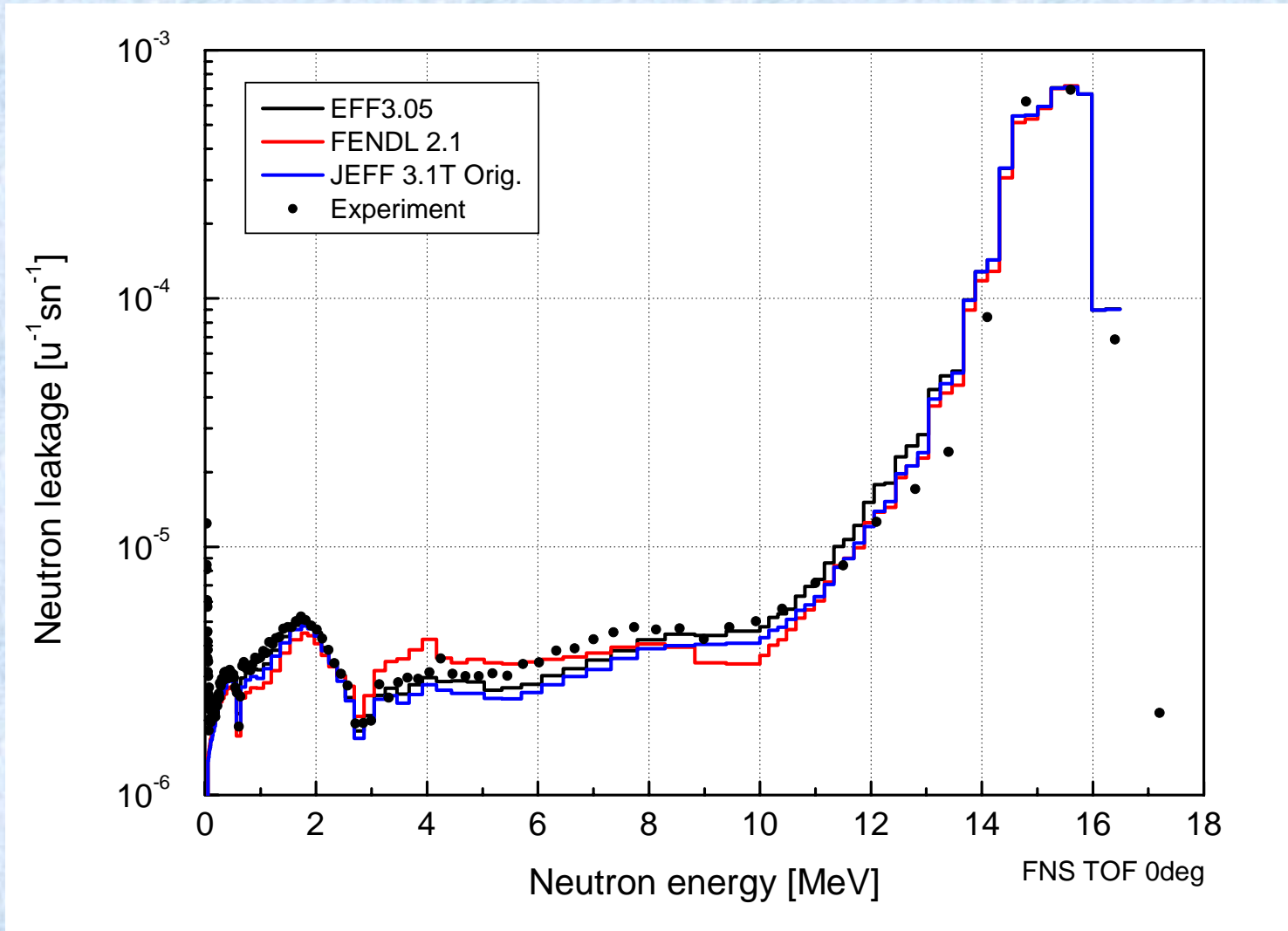


Experiences and Patches

- **Remarks on JEFF 3.1T Be9**
 - *Processing with (1) succeeded without errors, but benchmarking shows large deviations (EFFDOC-932, JEFF-Session, 3 May 2005)*
 - *Processing with (2) also successful (same ACE produced), also same results*
 - *Only (3) so far was fully satisfying*

 - *Problem with transformation from LAW67 to LAW61?*
 - *Problem with second neutron distribution?*
 - *Problem with file size?*

Neutron leakage spectra (FNS-TOF)



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