

Database management for preparing for ENDF/B-VIII

D.A. Brown, NNDC



Outline

- **ENDF/B-VII.2**
- **ENDF/B-VIII**
- **DOI issues**
- **ENDF website(s)**

Outline

- **ENDF/B-VII.2**
- ENDF/B-VIII
- DOI issues
- ENDF website(s)

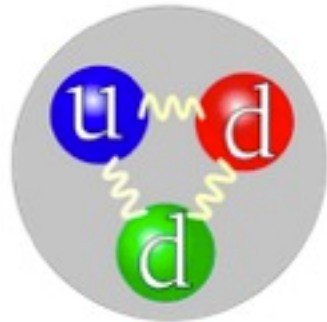
Details of an ENDF/B-VII.2 release

(as I see it)

- **Bug fixes**
 - Automated
 - Manual
- **An incomplete list of new/updated evaluations**
 - SiO₂, two phases MAT=47,49 (NCSU)
 - ^{63,65}Cu (ORNL)
 - ⁹⁰⁻⁹⁶Zr, Decay data fixes (BNL)
- **PR push/advertising**
 - Do we need a “Big Paper”?
 - Need to test that bug fixes didn’t cause trouble
 - Talks/meetings for announcing it
- **ENDF format for production; GND for testing**

Deficiencies noted by ADVANCE

<http://www.nndc.bnl.gov/endl/b7.dev/qa/neutrons/reports/neutrons.html>



Neutrons Sublibrary

ENDF/B Development Library

- ▶ General Information:
 - ▶ ENDF sublib designator: 10
- ▶ Revision Number: 611M
- ▶ Last Modified Revision: 532:611M
- ▶ Build Status:
 - ▶ Build status: **ERROR**
 - ▶ Build time: 2013-04-30 16:52:01.394282
 - ▶ Listfile: [neutrons.lst](#)
 - ▶ Release Notes: [neutrons-releaseNotes.pdf](#)
- ▶ GForge Links:
 - ▶ Browse [SVN](#)
 - ▶ Browse sublibrary [tracker](#)

Latest Updates

sublib_release_notes: neutrons

Report sublib_release_notes on neutrons generated. The result was a SUCCESS
2013-04-30 16:57:39.661872

evaluation_summary: n-098_Cf_251.endf

Code evaluation_summary completed run on n-098_Cf_251.endf. The result was a SUCCESS
2013-04-30 16:52:41.503573

sublib_html: neutrons

Report sublib_html on neutrons generated. The result was a SUCCESS
2013-04-30 16:52:01.501892

Summary
of all bugs

Periodic Table

Material List

1 H								X									2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe

Deficiencies noted by ADVANCE

(these are candidates for automatic fixing)

- **checkr** There is an error in an interpolation table for this data set: 2x
- **fizcon** All probability distributions should be normalized to 1, this one isn't.: 2x
- **fizcon** Data for a reaction started at a minimum E_{in} that is incorrect, based upon reaction's Q value.: 1x
- **fizcon** Outgoing energy E' not energetically allow: $E' \leq E - Q$.: 7x
- **fizcon** The cross section and an outgoing distribution don't span the same energy region.: 7x
- **fudge-4.0** Calculated and tabulated Q values disagree.: all of them
- **fudge-4.0** Calculated and tabulated thresholds don't agree: 28x
- **fudge-4.0** Energy doesn't balance: all of them
- **fudge-4.0** Energy range of data set does not match cross section range: 124x
- **fudge-4.0** Found a negative probability: 61x
- **fudge-4.0** Unnormalized outgoing probability distribution: most of them
- **njoy2012** An angular distribution is negative: 61x
- **njoy2012** Outgoing energy E' not energetically allow: $E' \leq E - Q$.: 42x

Possible automated fixes

- **Mass related fixes:**

- Sync masses,
- Q values,
- thresholds and
- end-points of E' spectra

- **Probability fixes:**

- Normalizations of all probabilities
- Put floor of zero on all probability distributions

- **Synchronize energy ranges between cross sections, distributions**

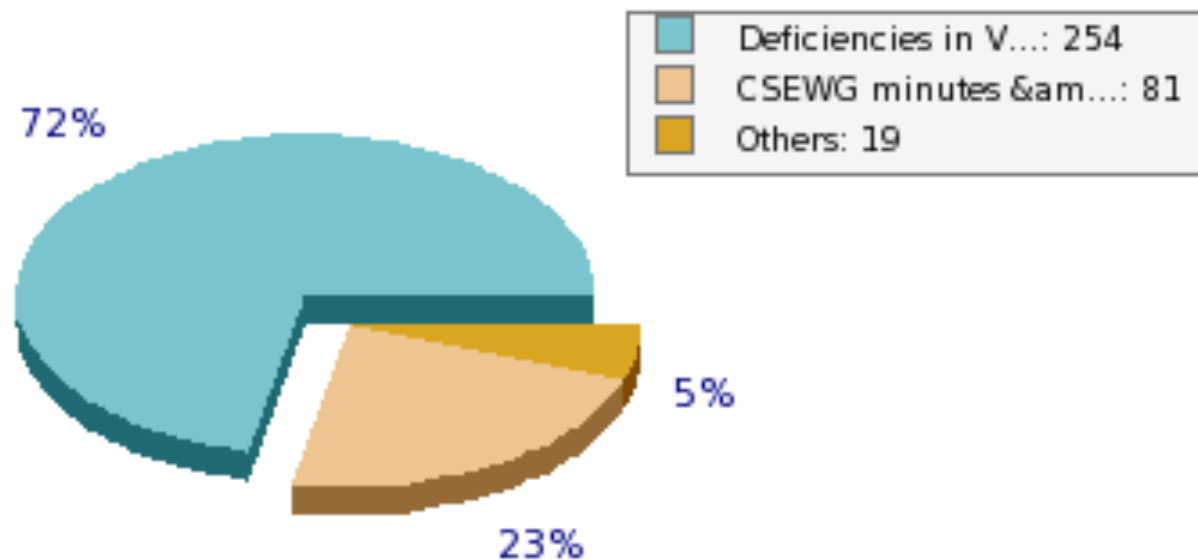
- **Line number removal**

2-3 weeks effort to implement

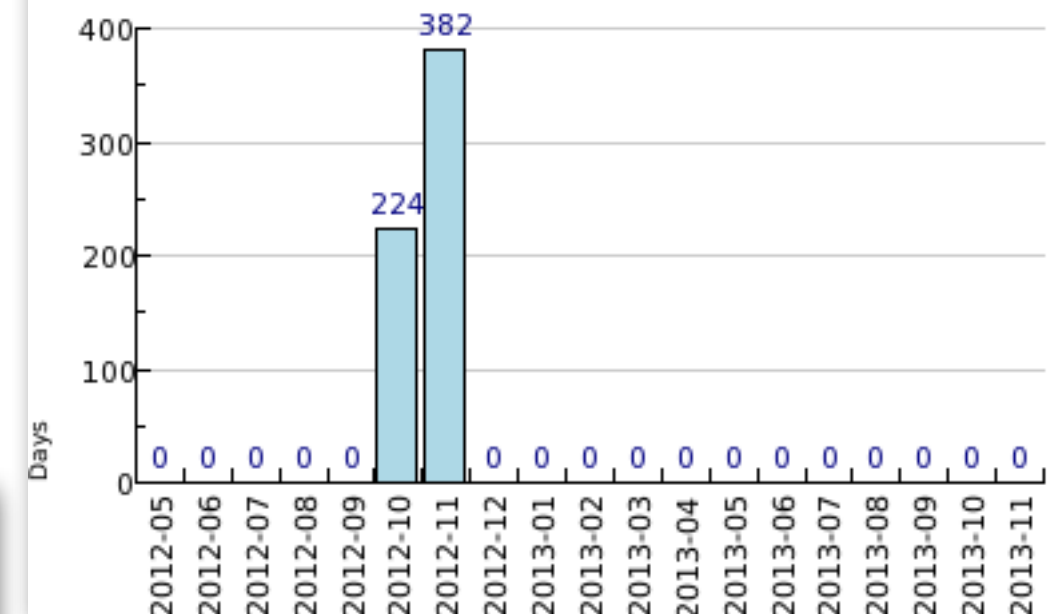
Summary of current deficiencies in GForge

- A lot of activity for ENDF/B-VII.1
- Steady growth of number of bugs since

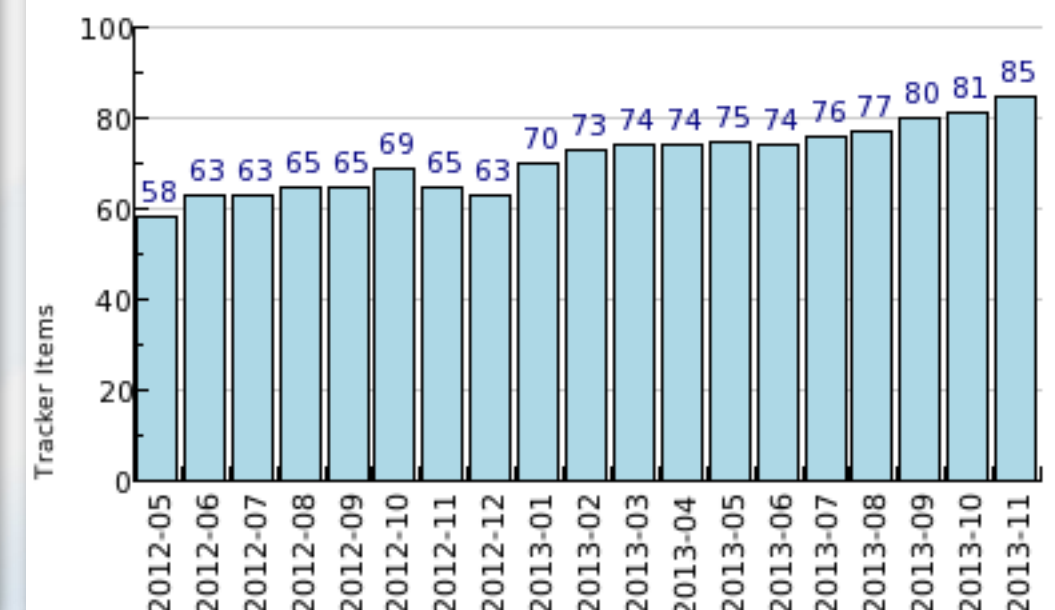
Tracker Items By Tracker



Average Age Of Items



Tracker Items That Remained Open In Each Month



Summary of current deficiencies in GForge

Deficiencies in VII deuteron

- H-2: Energy range too short in the (d,n) reaction 2009-12-22 13:50:15

Deficiencies in VII decay

- Unspecified: Inconsistencies in half-lives 2009-12-22 13:53:21
- Unspecified: Fission beta-spectra 40% lower than in VI.8 2009-12-22 13:51:55
- Unspecified: Masses (AWR) inconsistent 2009-12-22 13:54:34
- Sb-129: Inconsistency in beta decay 2009-12-22 13:55:32
- Rh-102, Rh-102m: Warning statement in MT451 2009-12-22 13:56:46
- a problem with the Half-life of Rf-261 or Rf 261m in ENDF VII 1 2013-10-10 05:32:34
- Kr-90 2013-11-15 07:24:18

Deficiencies in VII proton

- H-3: Energy range too short in the 3H(p,n)3He reaction 2009-12-22 13:47:23
- Ca-40, Cu-63: Inconsistent energy ranges in MF3 and MF6 2009-12-22 13:48:37
- Pb207 outgoing energies out of order 2012-03-09 17:44:26

Deficiencies in VII thermal scattering

- O in BeO, U in UO2: MAT numbers for thermal scat. 2009-12-22 13:45:02
- H in H2O: Wrong ZA value 2009-12-22 13:46:04
- U(UO2) and O(UO2) reversed 2012-07-10 13:36:07

Deficiencies in VII fission product yields (FPY)

- 241Pu in the rare earth region 2012-09-13 11:40:52
- As-84m doesn't exist, but we have a fission yield for it 2012-09-13 11:43:54
- FPY has non-existent metastable states 2013-09-21 05:43:57

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- U-235,238,Pu-239: Too coarse fission spectra
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- Mg-26, S-34, K-39: Problems with energy balance
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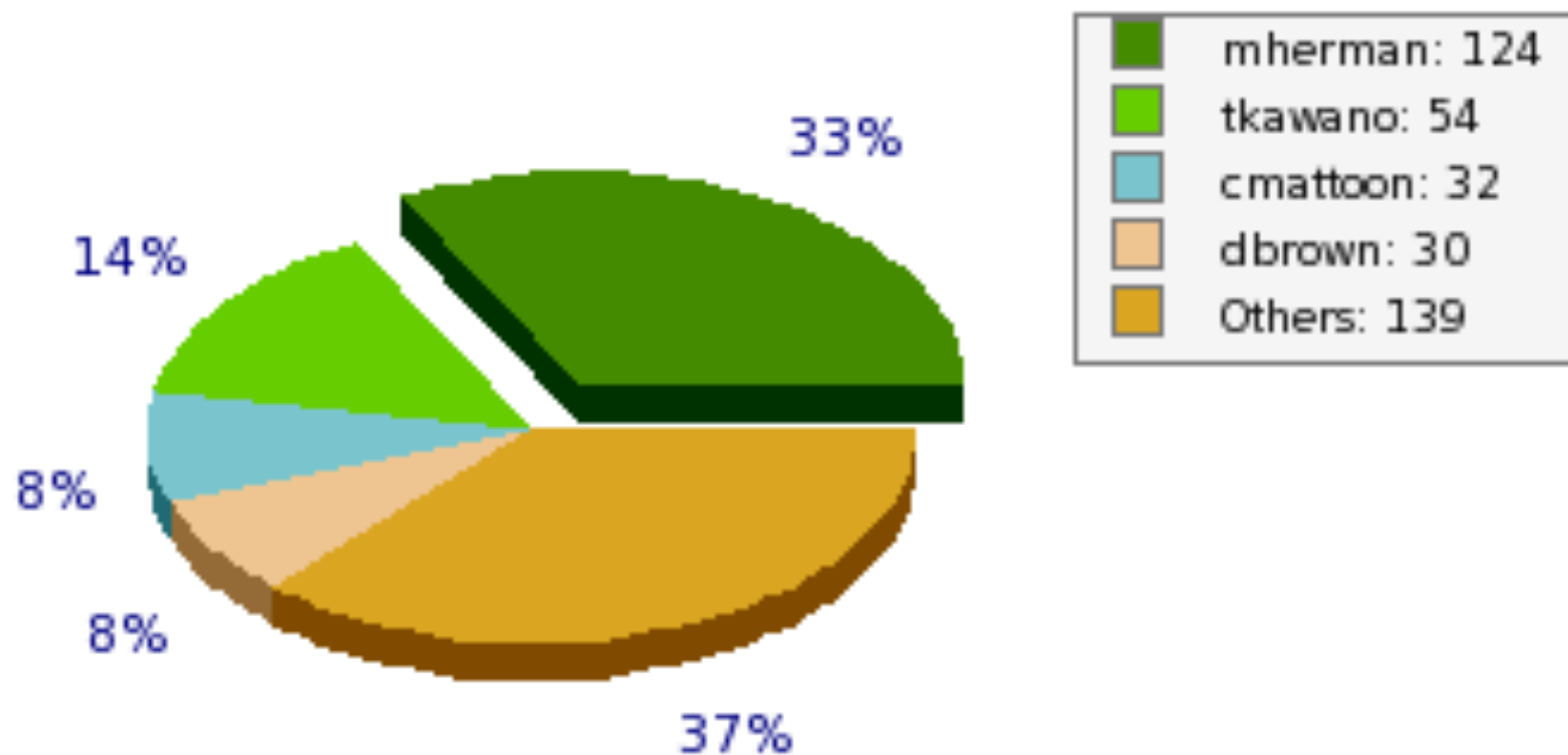
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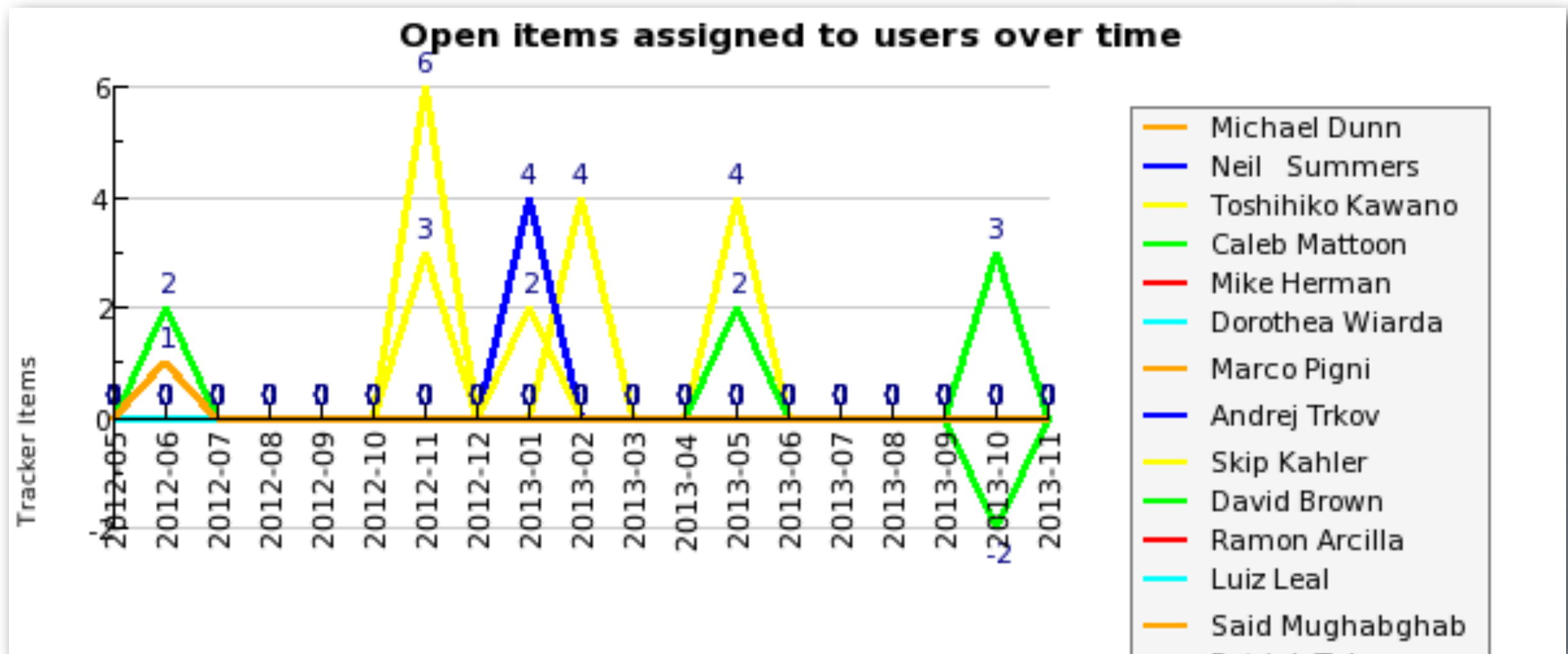
Getting through these and fixing the easy ones will take ~ 2 weeks

Who is submitting the bug reports?

Tracker Items By Assignee



Who is fixing the bugs?



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- ENDF/B-VII.2
- **ENDF/B-VIII**
- DOI issues
- ENDF website(s)

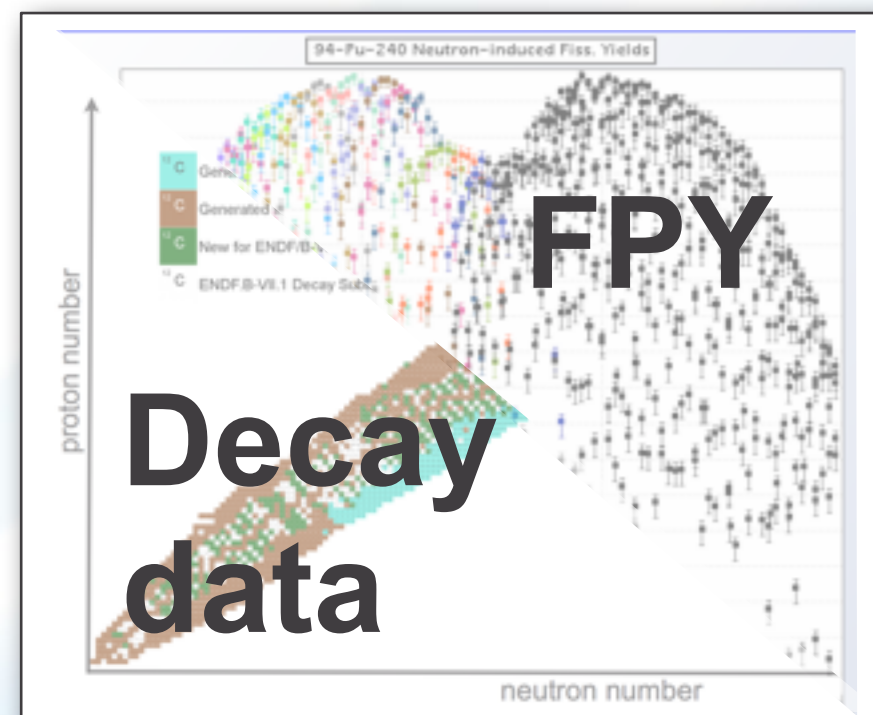
ENDF/B-VIII

CIELO: world-wide reaction data file

Join our CIELO collaboration



Generalized Nuclear Data (GND) Format



ENDF/B-VIII

Iron



Outline

- ENDF/B-VII.2
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- **DOI issues**
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DOI's are unique id's on a publication/dataset; doi.org resolves them to URLs



The screenshot shows the DOI.org website. At the top is the DOI logo. Below it is a navigation bar with links: HOME | HANDBOOK | FACTSHEETS | FAQs | RESOURCES | USERS | NEWS | MEMBERS AREA. The main heading is "The DOI® System". Below this is a collage of images representing various fields: a film set with a clapperboard, a camera, a laptop, a microscope, and a satellite dish. To the right of the collage is a "Resolve a DOI Name" section with a text input field containing "10.1016/j.jnds.2011.11.002" and a "SUBMIT" button. Below this is a "DOI.ORG® In the News" section with several news links. At the bottom, there is a footer with the text: "Updated 9 April 2013 | DOI®, DOI.ORG® and shortDOI® are trademarks of the International DOI Foundation."

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The DOI® System

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The IDF is the governance and management body for the federa the registration authority for the ISO standard (ISO 26324) for t

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Nuclear Data Sheets

Volume 112, Issue 12, December 2011, Pages 2887–2996

Special Issue on ENDF/B-VII.1 Library

ENDF/B-VII.1 Nuclear Data for Science and Technology: Cross Sections, Covariances, Fission Product Yields and Decay Data

M.B. Chadwick^a, M. Herman^b, P. Obložinský^b, M.E. Dunn^c, Y. Danon^d, A.C. Kahler^a, D.L. Smith^a, B. Pritychenko^b, G. Arbanas^e, R. Arcilla^b, R. Brewer^a, D.A. Brown^{b,f}, R. Capote^g, A.D. Carlson^h, Y.S. Cho^m, H. Derrien^c, K. Guber^c, G.M. Hale^a, S. Hoblit^b, S. Holloway^a, T.D. Johnson^b, T. Kawano^a, B.C. Kiedrowski^a, H. Kim^m, S. Kunieda^{a,n}, N.M. Larson^c, L. Leal^c, J.P. Lestone^a, R.C. Little^a, E.A. McCutchan^b, R.E. MacFarlane^a, M. MacInnes^a, C.M. Mattoon^f, R.D. McKnight^a, S.F. Mughabghab^b, G.P.A. Nobre^b, G. Palmiotti^o, A. Palumbo^b, M.T. Pigni^c, V.G. Pronyaevⁱ, R.O. Sayer^c, A.A. Sonzogni^b, N.C. Summers^f, P. Talou^a, I.J. Thompson^f, A. Trkov^j, R.L. Vogt^f, S.C. van der Marck^k, A. Wallner^l, M.C. White^a, D. Wiarda^c, P.G. Young^a

^a Los Alamos National Laboratory, Los Alamos, NM 87545, USA
^b Brookhaven National Laboratory, Upton, NY 11973-5000, USA
^c Oak Ridge National Laboratory, Oak Ridge, TN 37831-6171, USA
^d Rensselaer Polytechnic Institute, Troy, NY 12180, USA
^e Argonne National Laboratory, Argonne, IL 60439-4842, USA
^f Lawrence Livermore National Laboratory, Livermore, CA 94551-0808, USA
^g International Atomic Energy Agency, Vienna-A-1400, PO Box 100, Austria
^h National Institute of Standards and Technology, Gaithersburg, MD 20899-8463, USA
ⁱ Institute of Physics and Power Engineering, Obninsk, Russian Federation
^j Jozef Stefan Institute, Jamova 39, 1000 Ljubljana, Slovenia
^k Nuclear Research and Consultancy Group, P.O. Box 25, NL-1755, ZG Petten, The Netherlands
^l Faculty of Physics, University of Vienna, Waehringer Strasse 17, A-1090 Vienna, Austria
^m Korea Atomic Energy Research Institute, Daejeon, Korea
ⁿ Idaho National Laboratory, Idaho Falls, ID 83415, USA
^o Japan Atomic Energy Agency, Tokai-mura Naka-gun, Ibaraki 319-1195, Japan

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Bibliographic information

Citing and related articles

This article belongs to a special issue

Special Issue on ENDF/B-VII.1 Library

Edited By Pavel Obložinský

Other articles from this special issue

Preface

Pavel Obložinský

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ENDF/B-VII.1 Neutron Cross Section...

A.C. Kahler, R.E. MacFarlane, R.D. Mosteller ...

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2011, Nuclear Data Sheets

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Workspace

osti.gov and datacite.org want DOI's on all nuclear data in US; likely by end of FY14



■ DOI's are unique id's on a publication/dataset

- NNDC will generate them for NNDC-generated data
- If CSEWG & USNDP OK, we will assign DOI's for all US nuclear databases
- We decide on URL scheme
- We provide a permanent URL to a dataset, datacite.org maintains the DOI->URL redirect
- We promise to maintain URL's forever (or provide tombstone)

■ This is a very good thing

- Gives proper credit to evaluators
- Generates citations (always good for performance appraisals)

How does this affect us?

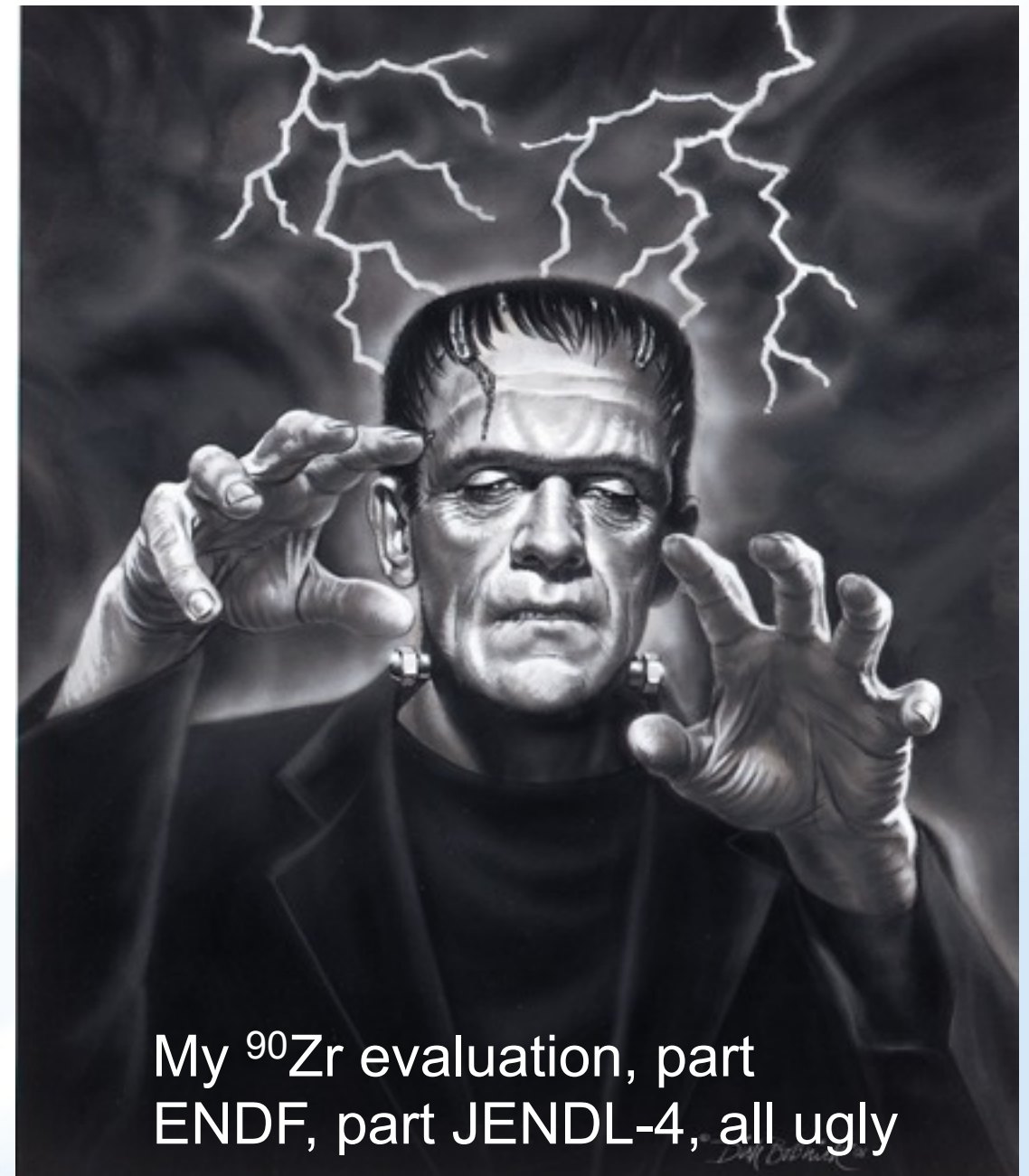


- **ENDF borrows from other libraries**

We'd like to be able to give proper credit; e.g a JAEA DOI for a JENDL-4.0 derived evaluation rather than an NNDC DOI

- **What about partial evaluations?**

Fine grained DOI's (i.e. on evaluation parts) allow us to make Frankenevaluations with proper attribution.



My ^{90}Zr evaluation, part ENDF, part JENDL-4, all ugly

For ENDF/B series libraries, these are my first thoughts



■ For legacy libraries (ENDF/B-I through VI)

- These were distributed in tapes (real or virtual)
- Each tape provided updates to your center's copy of the library
- MAT's, MT's and MF's all jumbled
- Records of what is on what tape and when they were released not easily recoverable
- Released data != what we see on web
- **Proposed solution:** One DOI for each release of a library

■ For ENDF/B-VII series

- Distinct sublibraries and distinct evaluations
- One material, zero or one projectile
- Clear release procedures
- ENDF format does have clear structure, so could give DOI's for each MF/MT, but we can't tell who evaluated which part
- **Proposed solution:**
 - One DOI for each evaluation
 - Need DOI's from other centers?

Outline

- ENDF/B-VII.2
- ENDF/B-VIII
- DOI issues
- **ENDF website(s)**

ENDF Project Pages

- **Reorganized the set of ENDF web pages:** <http://www.nndc.bnl.gov/endl/project.html>
- **Compiling ENDF history back to ENDF/B-I**
 - Data files
 - Lab reports (BNL & others)
 - Formats
- **Links to ENDF development pages**
- **ENDF QA Page:** <http://www.nndc.bnl.gov/endl/b7.dev/qa.html>
 - Includes ADVANCE requirements document
 - Various ENDF QA requirements documents