TUNL Contributions in the US Nuclear Data Program

Nuclear Structure Data Evaluation Program

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We are responsible for nuclear structure evaluation in the A=2-20 mass region

- Energy Levels of Light Nuclei reviews published in Nuclear Physics A
- ENSDF files for A=2-20
- XUNDL from A=2-20

Web interface for A=3-20 Information

This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics.

Recent Evaluation Activities

- Work in progress:
  - Submitted A=12 Evaluation for “Energy Levels” to NPA
  - Finalizing A=12 ENSDF file
  - Preparing NDS articles on *A*=2 and *A*=13
- ENSDF datasets for
  - ^{4,6}n,^{7}H,^{16,18}B,^{17,18,19}C,^{15}F, ^{17,18,19}Na
- Updated β-n
  - β-n: ^{17}B, ^{17}C,^{18}C
- β-decay lifetimes

TUNL Nuclear Data Evaluation Project

Energy Levels of Light Nuclei, A = 3 - 20

Nuclear Data Evaluation Project
Triangular Universities Nuclear Laboratory

TUNL Nuclear Data Evaluation Home Page

Information on mass chains and nuclides

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• TUNL Nuclear Data Group: Who we are and what we do.

Our publications on Energy Levels of Light Nuclei, A = 5 - 20:

• Publications: TUNL evaluations of A = 3 - 20, and modified versions of Fay Ajzenberg-Selove's publications of A = 5 - 20, are available here in PDF format. The most recent HTML documents of A = 3 - 20, and EL diagrams of A = 4 - 20 are also available here. Some reprints and preprints may be requested by mail.

• HTML for Nuclides: HTML documents are available for individual nuclides found within the TUNL or FAS evaluations.

Resources relating to our publications:

• Energy Level Diagrams are available for A = 4 - 20 nuclides.

• Tables of Energy Levels: a brief listing of tables of energy levels from the most recent publication for each nuclide A = 4 - 20.

• SiteMap and Complete List of Available TUNL Documents: Trying to find a specific TUNL evaluation or preliminary report, HTML document, General Table, Update List or Energy Level Diagram? Click here for a complete list of what's available on our website.

Applications and databases relating to the A = 3 - 20 nuclides:

• NSR Key Number Retrieval

• ENSDF: Information for A = 2 - 20 nuclides available through the National Nuclear Data Center (NNDC) site.

• Excitation Functions: Compilation of the excitation functions for various (p, X) and (α, X) reactions.

• Thermal Neutron Capture Data: Summary of level and branching intensity data measured in Thermal Neutron Capture.

• Ground-State Decay Data: Summary of half-life, branching intensity, and mass excess data measured in ground state beta- and charged-particle-decay.

• Half-Lives Table: List table of nuclear decay half-lives.

• NuDat at BNL: Allows to search and plot nuclear structure and nuclear decay data interactively.

Helpful links:

• TUNL Dissertations: Online access of TUNL dissertations collection. This site is in progress.

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Overview of A=3-20 Lifetimes

Nuclide (β^- Decay)	Half-Life	Date	Nuclide (β^+ Decay)	Half-Life	Date
^{3}H	12.323 ± 0.020 yr	September, 2015	^{7}Be	53.22 ± 0.06 days	August, 2001
^{6}He	$806.89^{+0.25}_{-0.22}$ ms	August, 2015	^{8}B	770.3 ± 0.4 ms	July, 2015
^{8}He	119.0 ± 1.6 ms	September, 2015	^{9}C	126.5 ± 1.0 ms	July, 2015
^{8}Li	838.79 ± 0.36 ms	August, 2015	^{10}C	19.3015 ± 0.0017 sec	May, 2016
^{9}Li	177.7 ± 0.6 ms	August, 2015	^{11}C	20.360 ± 0.022 min	August, 2015
^{10}Be	(1.51 ± 0.06) × 10^{6} yr	August, 2015	^{12}N	11.000 ± 0.016 ms	August, 2015
^{11}Li	8.74 ± 0.15 ms	August, 2015	^{13}N	9.967 ± 0.005 min	July, 2015
^{11}Be	13.77 ± 0.08 sec	July, 2015	^{13}O	8.58 ± 0.07 ms	July, 2015
^{12}Be	21.46 ± 0.05 ms	September, 2015	^{14}O	70.616 ± 0.020 sec	February, 2016
^{12}B	20.22 ± 0.04 ms	September, 2015	^{15}O	122.22 ± 0.32 sec	September, 2015
^{13}B	17.30 ± 0.17 ms	July, 2015	^{17}F	64.385 ± 0.053 sec	April, 2016
^{14}Be	4.65 ± 0.20 ms	August, 2015	^{17}Ne	109.2 ± 0.6 ms	July, 2015
^{14}B	12.6 ± 0.6 ms	July, 2015	^{18}F	109.733 ± 0.011 min	July, 2015
^{14}C	5686 ± 40 yr	September, 2015	^{18}Ne	1.66428 ± 0.00060 sec	August, 2015
^{15}B	10.00 ± 0.11 ms	September, 2015	^{19}Ne	17.260 ± 0.014 sec	September, 2015
^{15}C	2.450 ± 0.005 sec	August, 2015	^{20}Na	447.9 ± 2.3 ms	September, 2015
^{16}C	0.750 ± 0.008 sec	September, 2015	^{20}Mg	90.4 ± 0.7 ms	April, 2017

Nuclide	Method	Value	Quality Factor	Outliers	Recommended
10C	Unweighted Average	19.270(22) sec	N/A	1949SH25: 19.10(80) sec	19.3015(17) sec
	Weighted Average	19.3015(17)	Chi^2: 1.22		
	Limit. of Stat. Weights	19.3015(17)	Chi^2: 1.22		
	Normalization Residuals	19.3015(17)	Chi^2: 1.22		
	Rajeval Technique	19.3008(16)	Chi^2: 0.90		
	MBR (Method of Best Representation)	19.296(11)	69.60%		
	Boostrap	19.294(10)	Chi^2: 3.99		
	Mandel-Paule	19.3015(27)	Chi^2: 1.22		

Measured half-life for $^{10}C(\beta^+)^{10}B$

Recommended value (May, 2016): 19.3015 ± 0.0 sec

Summary Table of Uncertainty Analysis: Table Prev. (P

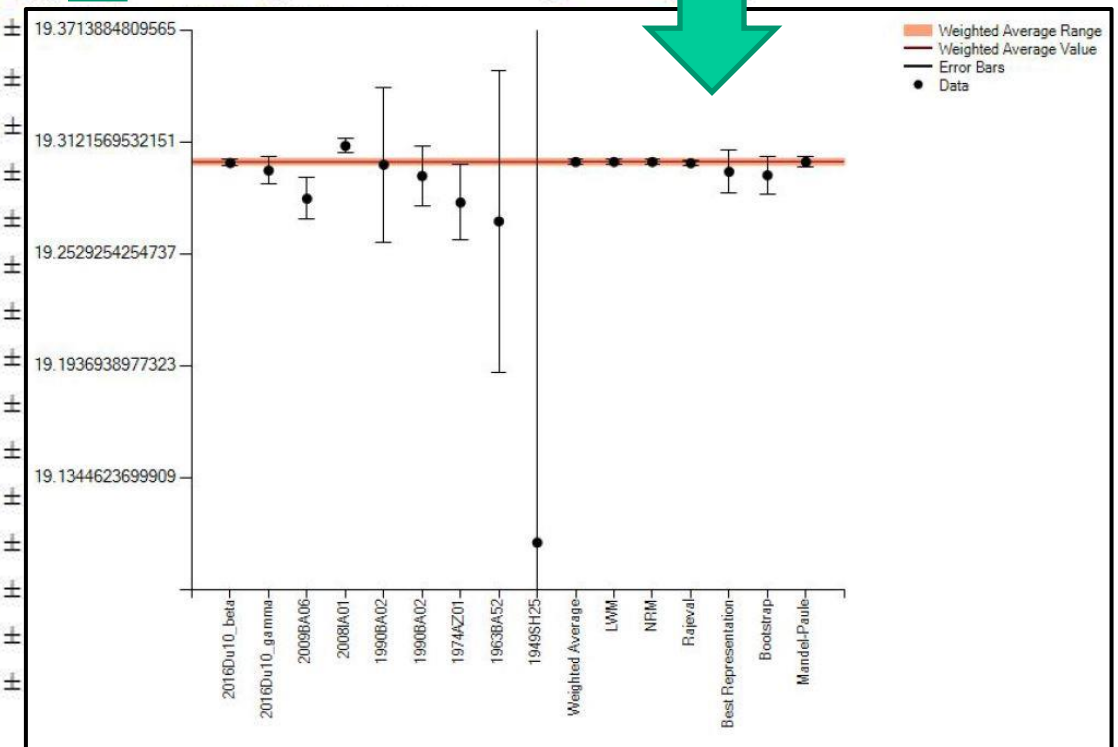
Summary Chart of All Values: Chart Prev.

Measured values:

19.3009 ±
19.2969 ±
19.282 ±
19.310 ±
19.300 ±
19.294 ±
19.28 ±
19.151 ±
19.27 ±
19.48 ±
19.1 ±

Other Reviews:

19.3052 ±
19.3080 ±
19.255 ±
19.305 ±



Compilation Activities

- Committed to XUNDL (A=2-20)
  - (5-6/month) about 65 per year
- Compilation of ground state decay & β-decay references and data
- Compilation of (p,X) and (α,X) excitation functions
- Compilation of thermal neutron capture references and data
- TUNL Dissertations-

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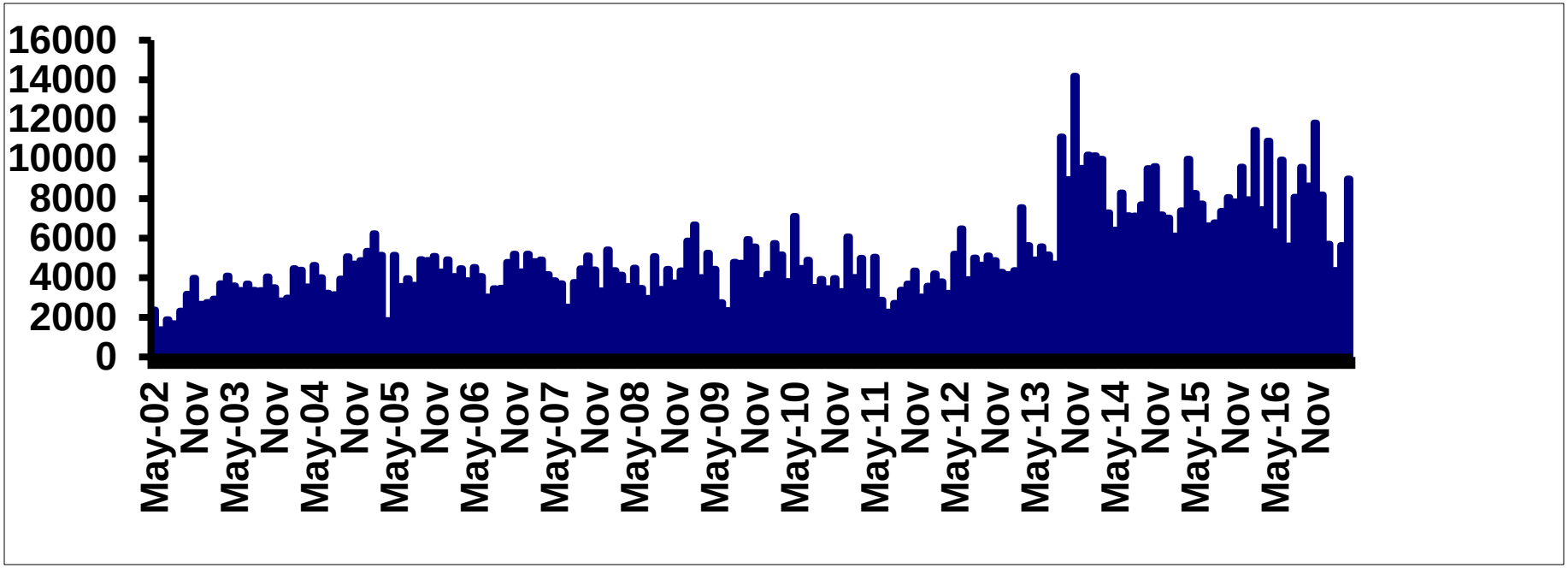
WWW (April 02 –present)
2016: Σ=105.9 k



Using Analog - finding issues with excluding new search engine "robots"

NDS-JAVA Workshop at TUNL

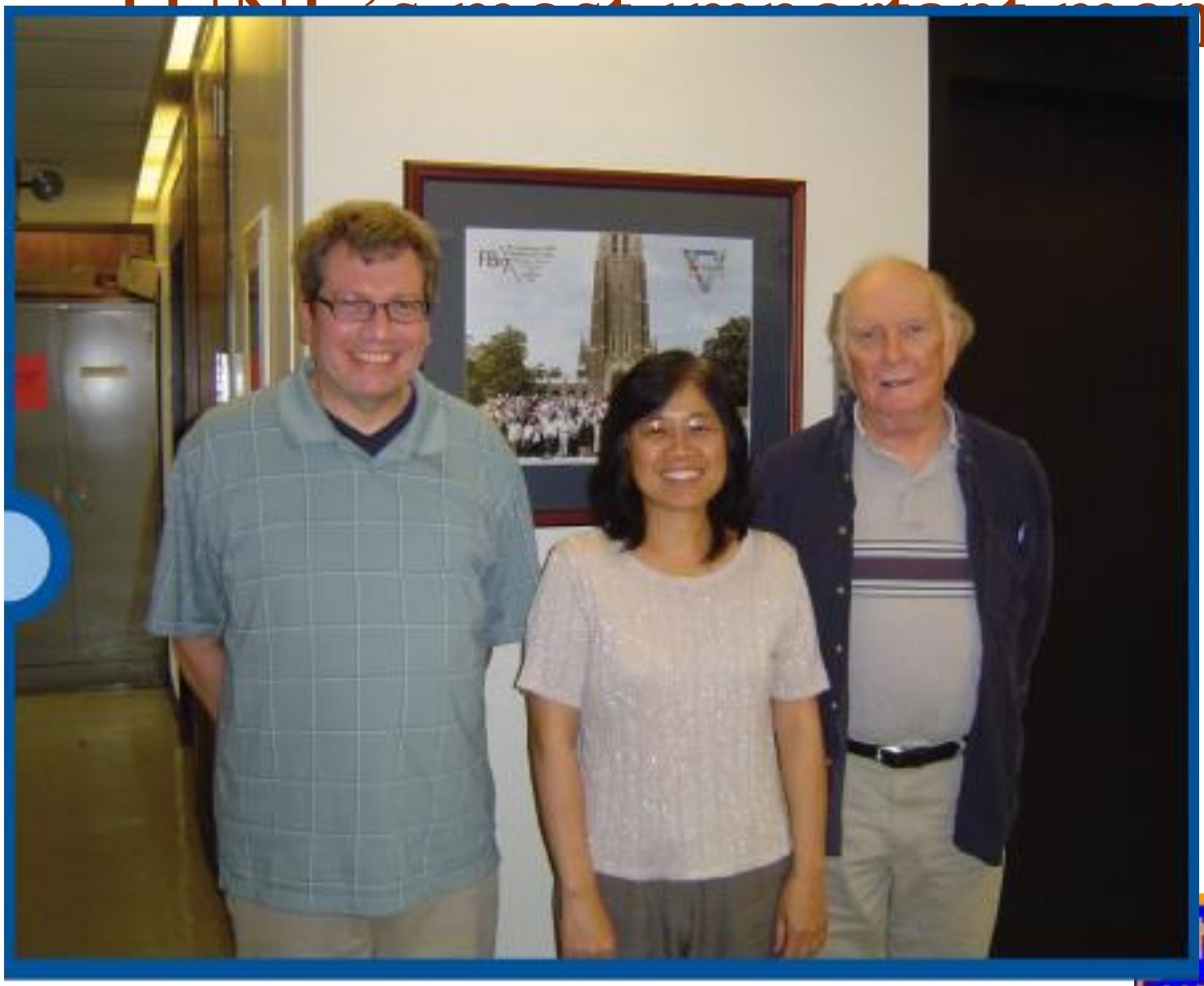
Agenda: as developed at the meeting.

1. Discussion on General Structure of the Output
    a. Tables
    b. Drawings
    c. Comments (including flagged footnotes)
    d. References
2. Translation
3. Execution of the program
    a. Distribution/installation
    b. Control file
4. Specialized comments
5. Implementation

A Summary of the workshop findings follows.

1. The move from NSD-pub to NDS-Java is favored.
2. All present are agreeable to the new format with the suggested tweaks added. Prior to the workshop, the attendees had sought input from users that critiqued the proposed new presentation. Those comments carried a clear favorability toward the changes present in the NDS-Java output.
3. Jun and Balraj have done an outstanding job

TLNL's most important member



NL Nuclear Data
Evaluation Project