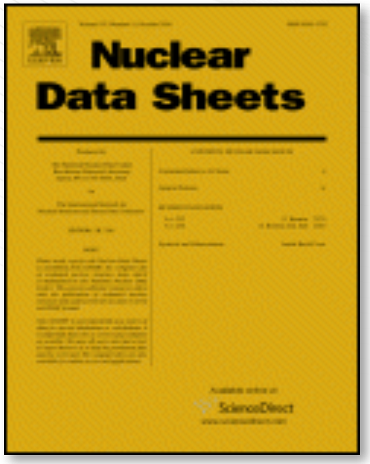
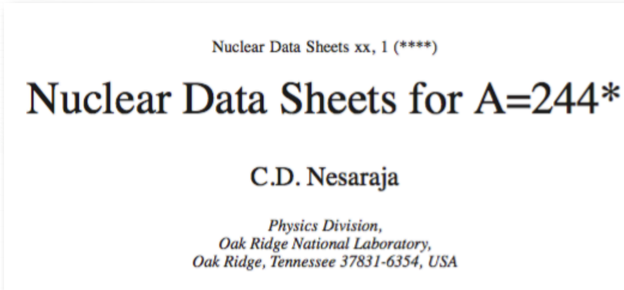
Nuclear Data Activities at ORNL

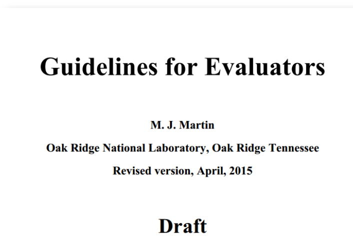



Nuclear Data Sheets xx, 1 (****)

Nuclear Data Sheets for A=244*

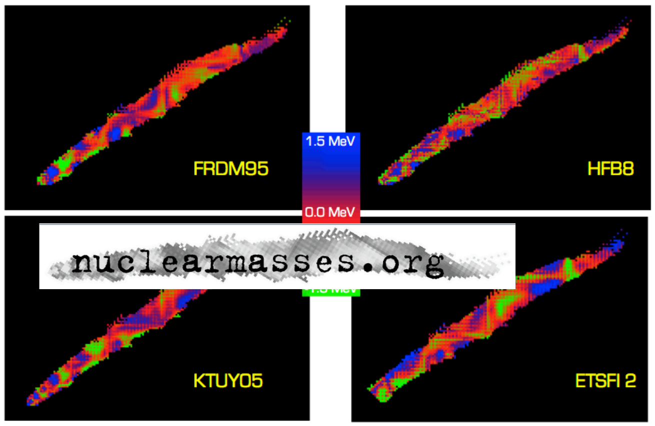
C.D. Nesaraja

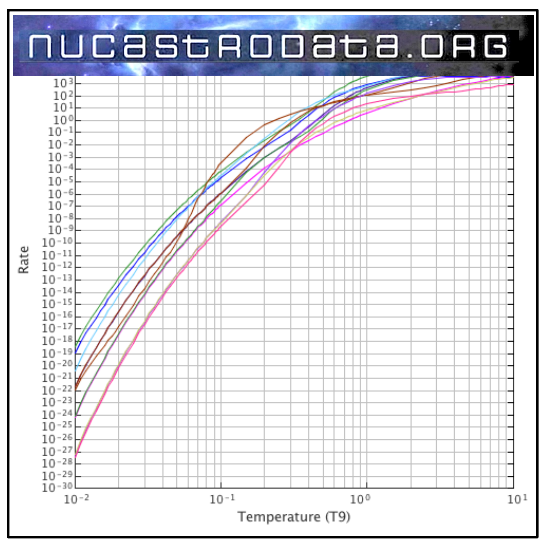
Physics Division,
Oak Ridge National Laboratory,
Oak Ridge, Tennessee 37831-6354, USA

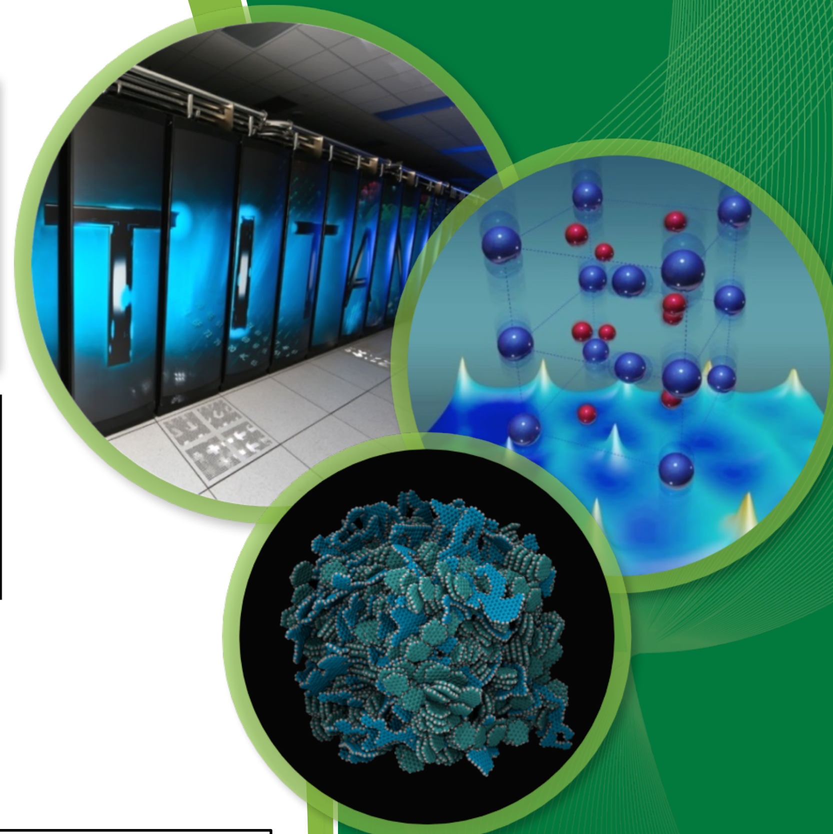

Guidelines for Evaluators

M. J. Martin
Oak Ridge National Laboratory, Oak Ridge Tennessee
Revised version, April, 2015

Draft







Michael Smith

Caroline Nesaraja

Murray Martin

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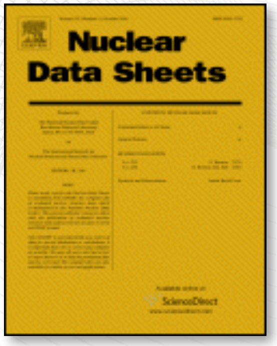
Activities and Capabilities



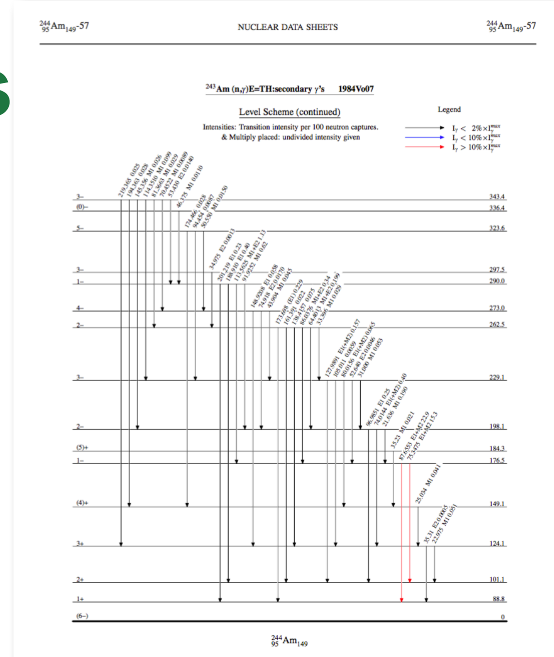
Nuclear Data Sheets xx, 1 (****)

Nuclear Data Sheets for A=244*

C.D. Nesaraja

Physics Division,
Oak Ridge National Laboratory,
Oak Ridge, Tennessee 37831-6354, USA

- Nuclear Structure (Nesaraja, Martin, C. Smith)
  - A-Chain Evaluations for ENSDF (A=241 – 249)
  - Compilations for XUNDL
  - Technique refinement / student training
- Nuclear Astrophysics (M. Smith, C. Smith, S. Zhang)
  - Assessing reaction and structure info critical for stellar explosion studies
  - Determining rates from USNDP and other data sets
  - Calculating rates with theoretical models
- Online Software Systems (M. Smith, E. Lingerfelt, C. Smith)
  - Updating / improving input
  - Maintaining codes and systems
  - Developing new user-requested features



76Se: 76Ge 2B-decay (2015Ag01)
112Sn: Coulomb Excitation (2015Al24)
114Sn: Coulomb Excitation (2015Al24)
116Sn: Coulomb Excitation (2015Al24)
118Sn: Coulomb Excitation (2015Al24)
120Sn: Coulomb Excitation (2015Al24)
122Sn: Coulomb Excitation (2015Al24)
124Sn: Coulomb Excitation (2015Al24)
140Ba: 12C(136Xe,140Baγ) (2015ST16)
186Re: 187Re(n,2nγ) (2015MaXX)
206Pb: 210Po alpha decay (2015Zh41)
86Se: 87As beta-n decay (2015KoAA)
87Se: 87As beta decay (2015KoAA)
195Bi:169Tm(30Si,4n) (2015Ro20)
124Cs:96Zr(32S,p3nγ) (2015Se17)
96Nb: 96Zr beta decay (2016Fi01)
119Sn:238Pb(48Ca,Xγ) (2016Is03)
121Sn:238Pb(48Ca,Xγ) (2016Is03)
123Sn:238Pb(48Ca,Xγ) (2016Is03)
125Sn:238Pb(48Ca,Xγ) (2016Is03)
50Cr: 50Cr(γ,γ') (2016Pa04)
23Mg: 3He(24Mg,αγ) (2016KiAA)
121Cd:9Be(238U,Xγ) (2016ReAA)
123Cd:9Be(238U,Xγ) (2016ReAA)
125Cd:9Be(238U,Xγ) (2016ReAA)
88Y: 89Y(p,dγ) (2016HuAA)
194Tl: 181Ta(18O,5ng) (2016Ma13)
111Cd: 111Cd IT decay (2016NiAA)
111In:T1/2:111In EC decay (2016DzAA)
131Xe:131I B decay (2016LeAA)
39Ca:1H(38K,γ) (2016Lo03)
48Ca: 48Ca(p,p') (2016BiAA)
106Pd: 106Pd(n,n'γ) (2016Pe06)
93Tc: 92Mo(p,γ) (2016Ma25)
176Lu(p,nγ) (2016BaAA
125Cs: 116Cd(14N,5nγ)
69Cu: 70Zn(d,3He)
244Pu: 244Pu(47Ti,47Ti'γ)(2016Ho13)
244Pu:244Pu(208Pb,208Pb'γ)(2016Ho13)

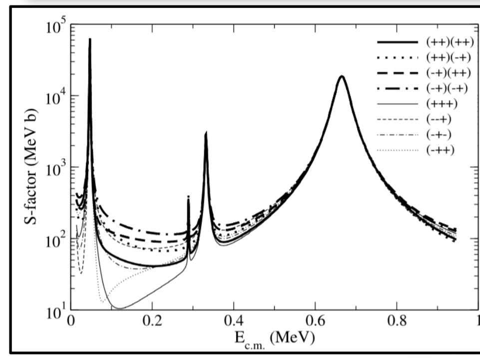
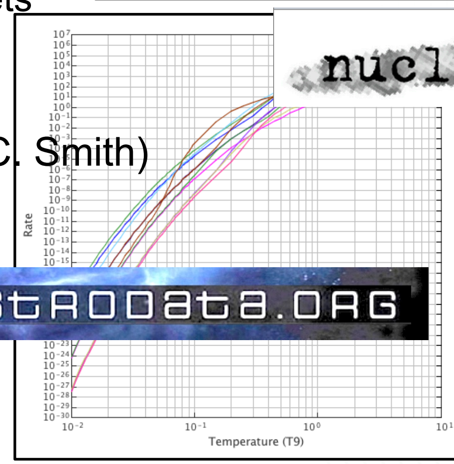


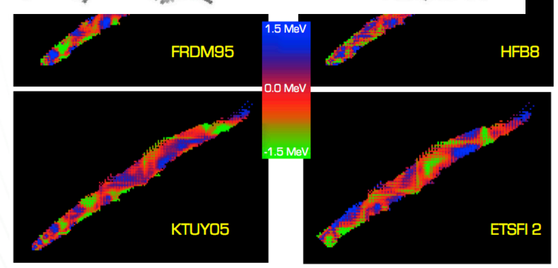
Table 2
The resonance parameters used and varied in the calculation of the $^{18}F(p,\alpha)^{15}O$ rate and its associated uncertainties. The ANC is given for the subthreshold resonance while other resonances are tabulated with their proton widths. Quantities come from measurements except where explicitly noted in the footnotes.

E_{res} (keV)	E_x (MeV)	$2J^\pi$	Γ_p (keV) or ANC (fm$^{1/2}$)	Γ_α (keV)
−124(3)	6.286(3)	1^+	83.5	11.6[a]
7(3)	6.417(3)	3^-	1.6×10^{-41}	< 0.5[a]
29(3)	6.439(3)	1^-	$< 3.8 \times 10^{-19}$[b]	220
47(3)	6.457(3)	3^+[a]	$< 2.1 \times 10^{-13}$	1.3[a]
289(3)	6.699(3)	5^+[a]	$< 2.4 \times 10^{-5}$[a]	1.2[a]
332(2)	6.742(2)	3^-	2.22×10^{-3}	5.2[a]
664.7(16)	7.0747(17)	3^+	15.2	23.8
1461(19)		1^+	55	347

[a] Adopted from mirror level.
[b] Based on assumed reduced proton width.



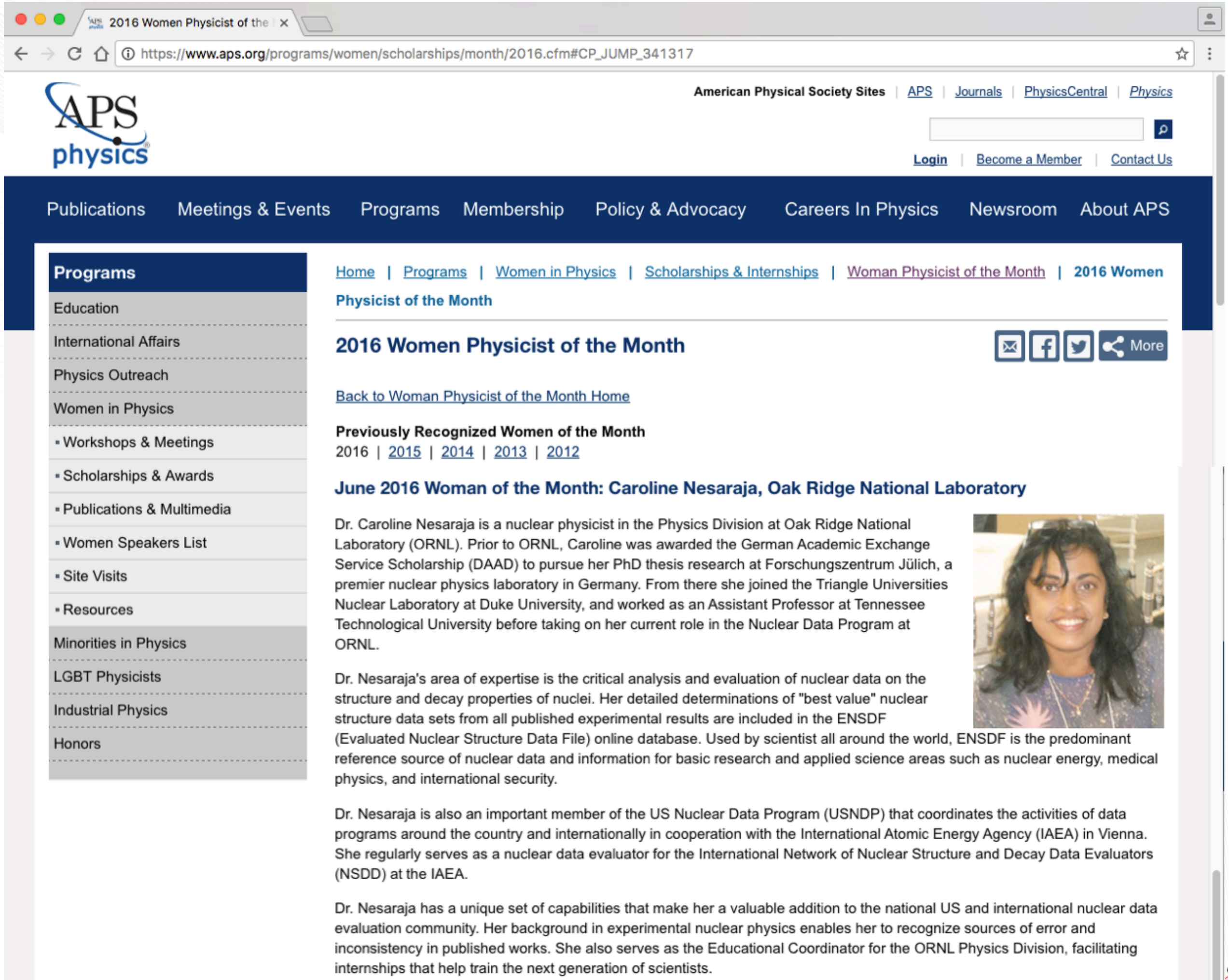
nuclearmasses.org



nucastrodata.org

Oak Ridge National Laboratory

Structure Evaluation Award



2016 Women Physicist of the

https://www.aps.org/programs/women/scholarships/month/2016.cfm#CP_JUMP_341317

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2016 Women Physicist of the Month

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June 2016 Woman of the Month: Caroline Nesaraja, Oak Ridge National Laboratory

Dr. Caroline Nesaraja is a nuclear physicist in the Physics Division at Oak Ridge National Laboratory (ORNL). Prior to ORNL, Caroline was awarded the German Academic Exchange Service Scholarship (DAAD) to pursue her PhD thesis research at Forschungszentrum Jülich, a premier nuclear physics laboratory in Germany. From there she joined the Triangle Universities Nuclear Laboratory at Duke University, and worked as an Assistant Professor at Tennessee Technological University before taking on her current role in the Nuclear Data Program at ORNL.

Dr. Nesaraja's area of expertise is the critical analysis and evaluation of nuclear data on the structure and decay properties of nuclei. Her detailed determinations of "best value" nuclear structure data sets from all published experimental results are included in the ENSDF (Evaluated Nuclear Structure Data File) online database. Used by scientist all around the world, ENSDF is the predominant reference source of nuclear data and information for basic research and applied science areas such as nuclear energy, medical physics, and international security.

Dr. Nesaraja is also an important member of the US Nuclear Data Program (USNDP) that coordinates the activities of data programs around the country and internationally in cooperation with the International Atomic Energy Agency (IAEA) in Vienna. She regularly serves as a nuclear data evaluator for the International Network of Nuclear Structure and Decay Data Evaluators (NSDD) at the IAEA.

Dr. Nesaraja has a unique set of capabilities that make her a valuable addition to the national US and international nuclear data evaluation community. Her background in experimental nuclear physics enables her to recognize sources of error and inconsistency in published works. She also serves as the Educational Coordinator for the ORNL Physics Division, facilitating internships that help train the next generation of scientists.

- In recognition of her work as a nuclear data evaluator, Caroline Nesaraja was named the **June 2016 Woman Physicist of the Month** by the American Physical Society's Committee on the Status of Women in Physics

OAK RIDGE National Laboratory

Evaluation Technique Refinement

Guidelines for Evaluators

M. J. Martin
Oak Ridge National Laboratory, Oak Ridge Tennessee
Revised version, April, 2015

Draft

Nuclear Data Sheets xx, 1 (****)

Nuclear Data Sheets for A=244*

C.D. Nesaraja

Physics Division,
Oak Ridge National Laboratory,
Oak Ridge, Tennessee 37831-6354, USA

- ENSDF Evaluation Guidelines
  - Initial version written in 1988, updated in 2015
  - Used as lectures in Specialized Workshop on NSDD Evaluations in 2015 at IAEA
  - Draft version online, revisions still in progress
  - Author Murray Martin currently collecting feedback
- Discussed special issues encountered during evaluations with LBNL/UCB evaluators
  - currently collecting information on a Google Drive for later distribution
- For A=244 evaluation, *learned*
  - K-forbidden beta transitions from “Theory of Complex Nuclei” (V.G. Soloviev 1976) and articles by Kondev and Dracoulis …
  - Gallagher- Moszkowski Rules and Newby shifts
  - Utility of BrIccMixing code to calculate δ (mixing ratios)
  - Alaga rules – wrote out detailed description

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Alaga Rules

244Am-Adopted Levels

173.8[b] 10 1- B

J^π: 75.3475 and 87.6553 γ's to 1+ and 2+ levels of K=1 band are E1+M2. The relative intensities of these γ's agree well with the Alaga rule for K=J=1, but not for J=2.
Additional documentation [0]

```
Alaga rule for E1 part of these two gammas predicts:

I(87.65G;E1)/I(75.34G;E1)

=(87.6553/75.3475)**3 (0.5/0.5)=1.57 for K=J=1;

=(87.6553/75.3475)**3 (0.60/0.33)=2.84 for K=J=2;

=(87.6553/75.3475)**3 (0.3000/0.1666667)=22.8 for K=1,J=2 and

The experimental ratio of intensities for E1 parts is

98.0/65.3=1.50.
```

M Martin

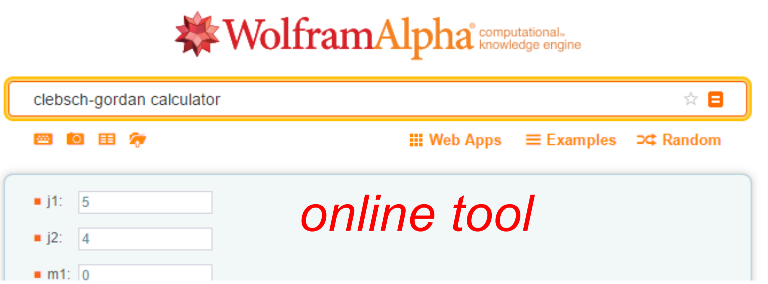
Alaga Rules

The relationship with which I am familiar is the following:

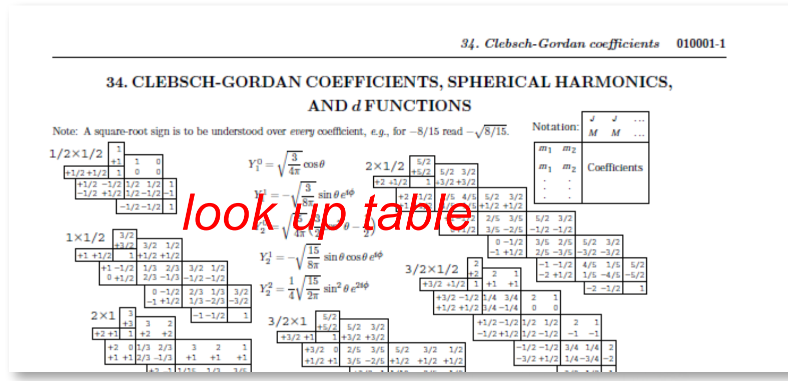
$BE2(J_i \rightarrow J_f)/BE2(J_i \rightarrow J_{f'}) = \langle J_iK_i2\Delta K|J_fK_f\rangle / \langle J_iK_i2\Delta K|J_{f'}K_{f'}\rangle$

where the expressions on the right are Clebsch Gordan coefficients, $\Delta K = K_i - K_f$, and the two final states have spins J_f and $J_{f'}$.

Unfortunately I don't have a table of Clebsch Gordan coefficients. We used to have a handy book with tables in the library, but I guess that has now been destroyed.



online tool



look up table

- Alaga Rules
  - Determine ratio of gamma transition probabilities involving C-G coefficients
  - Need to verify additional documentation in previous A=244 evaluation
  - Some previous descriptions incomplete or incorrect
  - Worked with young ORNL postdoc James Matta using online software code to correctly calculate

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Related Activities

PRL 117, 092501 (2016) PHYSICAL REVIEW LETTERS week ending 26 AUGUST 2016

Decays of the Three Top Contributors to the Reactor $\bar{\nu}_e$ High-Energy Spectrum, ^{92}Rb, ^{96gs}Y, and ^{142}Cs, Studied with Total Absorption Spectroscopy

B. C. Rasco,[1,2,3,4,*] M. Wolińska-Cichocka,[5,2,1] A. Fijałkowska,[6,3] K. P. Rykaczewski,[2] M. Karny,[6,2,1] R. K. Grzywacz,[3,2,1] K. C. Goetz,[7,3] C. J. Gross,[2] D. W. Stracener,[2] E. F. Zganjar,[4] J. C. Batchelder,[8,1] J. C. Blackmon,[4] N. T. Brewer,[1,2,3] S. Go,[3] B. Heffron,[3,2] T. King,[3] J. T. Matta,[2] K. Miernik,[6,1] C. D. Nesaraja,[2] S. V. Paulauskas,[3] M. M. Rajabali,[9] E. H. Wang,[10] J. A. Winger,[11] Y. Xiao,[3] and C. J. Zachary[10]

[1]*JINPA, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA*
[2]*Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA*
[3]*Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37966, USA*
[4]*Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana 70803 USA*
[5]*Heavy Ion Laboratory, University of Warsaw, PL-02-093 Warsaw, Poland*
[6]*Faculty of Physics, University of Warsaw, PL-02-093 Warsaw, Poland*
[7]*CIRE Bredesen Center, University of Tennessee, Knoxville, Tennessee 37966, USA*
[8]*Department of Nuclear Engineering, University of California, Berkeley, Berkeley California 94720, USA*
[9]*Department of Physics, Tennessee Technological University, Cookeville, Tennessee 38505, USA*
[10]*Department of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee 37235, USA*
[11]*Department of Physics and Astronomy, Mississippi State University, Mississippi State, Mississippi 39762, USA*

(Received 4 May 2016; published 22 August 2016)

We report total absorption spectroscopy measurements of ^{92}Rb, ^{96gs}Y, and ^{142}Cs β decays, which are the most important contributors to the high energy $\bar{\nu}_e$ spectral shape in nuclear reactors. These three β decays contribute 43% of the $\bar{\nu}_e$ flux near 5.5 MeV emitted by nuclear reactors. This $\bar{\nu}_e$ energy is particularly interesting due to spectral features recently observed in several experiments including the Daya Bay, Double Chooz, and RENO Collaborations. Measurements were conducted at Oak Ridge National Laboratory by means of proton-induced fission of ^{238}U with on-line mass separation of fission fragments and the Modular Total Absorption Spectrometer. We observe a β-decay pattern that is similar to recent measurements of ^{92}Rb, with a ground-state to ground-state β feeding of 91(3)%. We verify the ^{96gs}Y ground-state to ground-state β feeding of 95.5(20)%. Our measurements substantially modify the β-decay feedings of ^{142}Cs, reducing the β feeding to ^{142}Ba states below 2 MeV by 32% when compared with the latest evaluations. Our results increase the discrepancy between the observed and the expected reactor $\bar{\nu}_e$ flux between 5 and 7 MeV, the maximum excess increases from ~10% to ~12%.

- Collaboratored with K. Rykaczewski et al. on total absorption spectroscopy measurements relevant for reactor neutrino spectrum (measurement supported by Data Program)
- Visited LBNL for a month and participated in beamline calibration run at the 88” cyclotron to benchmark its use to measure isotope production
- Saving legacy reports and private communications
  - Extensive documentation at ORNL of critical private communication, reports, theses …
  - Worked with J. Totans to sort, pack, and ship to BNL for inclusion in NNDC library

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Astrophysics Reactions

Available online at www.sciencedirect.com
ScienceDirect
Nuclear Physics A 841 (2010) 31–250
NUCLEAR PHYSICS A
www.elsevier.com/locate/nuclphysa

Charged-particle thermonuclear reaction rates: II. Tables and graphs of reaction rates and probability density functions

C. Iliadis [a,b,*], R. Longland [a,b], A.E. Champagne [a,b], A. Coc [c], R. Fitzgerald [d]

[a] *Department of Physics and Astronomy, University of North Carolina, Chapel Hill, NC 27599-3255, USA*
[b] *Triangle Universities Nuclear Laboratory, Durham, NC 27708-0308, USA*
[c] *Centre de Spectrométrie Nucléaire et de Spectrométrie de Masse (CSNSM), UMR 8609, CNRS/IN2P3 and Université Paris Sud 11, Bâtiment 104, 91405 Orsay Campus, France*
[d] *National Institute of Standards and Technology, 100 Bureau Drive, Stop 8462, Gaithersburg, MD 20899-8462, USA*

Received 21 December 2009; received in revised form 21 April 2010; accepted 22 April 2010

Available online 28 April 2010

NACRE II: an update of the NACRE compilation of charged-particle-induced thermonuclear reaction rates for nuclei with mass number $A < 16$

Y. Xu[a,1], K. Takahashi[a,b], S. Goriely[a], M. Arnould[a,*]

[a] *Institut d'Astronomie et d'Astrophysique, Université Libre de Bruxelles, Belgium*
[b] *GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany*

M. Ohta[c,d], H. Utsunomiya[d]

[c] *Hirao School of Management, Konan University, Kobe, Japan*
[d] *Department of Physics, Konan University, Kobe, Japan*

Abstract

An update of the NACRE compilation [Angulo et al., Nucl. Phys. A 656 (1999) 3] is presented. This new compilation, referred to as NACRE II, reports thermonuclear reaction rates for 34 charged-particle induced, two-body exoergic reactions on nuclides with mass number $A < 16$, of which fifteen are particle-transfer reactions and the rest radiative capture reactions. When compared with NACRE, NACRE II features in particular (1) the addition to the experimental data collected in NACRE of those reported later, preferentially in the major journals of the field by early 2013, and (2) the adoption of potential models as the primary tool for extrapolation to very low energies of astrophysical *S*-factors, with a systematic evaluation of uncertainties.

As in NACRE, the rates are presented in tabular form for temperatures in the $10^6 \lesssim T \leq 10^{10}$ K range. Along with the 'adopted' rates, their low and high limits are provided. The new rates are available in electronic form as part of the Brussels Library (BRUSLIB) of nuclear data. The NACRE II rates also supersede the previous NACRE rates in the Nuclear Network Generator (NETGEN) for astrophysics. [http://www.astro.ulb.ac.be/databases.html.]

Keywords: thermonuclear reaction rates, nuclear astrophysics, potential model, dwba model

- Processing data sets for use in astrophysical models
  - required several improvements for fitting code
  - without this processing, published rates cannot be used in most popular nucleosynthesis codes
  - paper in preparation on fits to 96 rates

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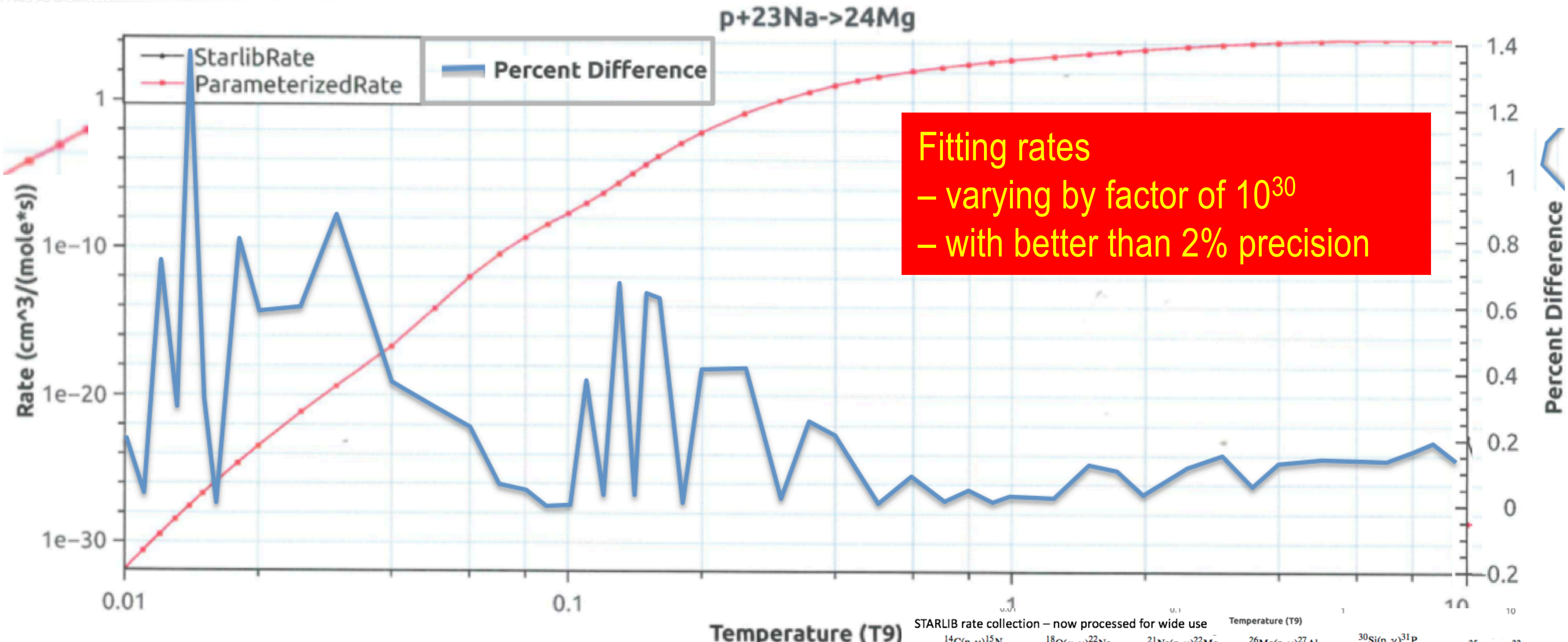
Astrophysics Reactions



Fitting rates
– varying by factor of 10^{30}
– with better than 2% precision

STARLIB rate collection – now processed for wide use

$^{14}C(p,\gamma)^{15}N$	$^{18}O(\alpha,\gamma)^{22}Ne$	$^{21}Na(p,\gamma)^{22}Mg$	$^{26}Mg(p,\gamma)^{27}Al$	$^{30}Si(p,\gamma)^{31}P$	$^{35}Cl(p,\alpha)^{32}S$
$^{14}C(\alpha,\gamma)^{18}O$	$^{17}F(p,\gamma)^{18}Ne$	$^{22}Na(p,\gamma)^{23}Mg$	$^{23}Al(p,\gamma)^{24}Si$	$^{27}P(p,\gamma)^{28}S$	$^{34}Ar(p,\gamma)^{35}K$
$^{14}N(\alpha,\gamma)^{18}F$	$^{18}F(p,\gamma)^{19}Ne$	$^{23}Na(p,\gamma)^{24}Mg$	$^{24}Al(p,\gamma)^{25}Si$	$^{29}P(p,\gamma)^{30}S$	$^{35}Ar(p,\gamma)^{36}K$
$^{15}N(\alpha,\gamma)^{19}F$	$^{18}F(p,\alpha)^{15}O$	$^{23}Na(p,\alpha)^{20}Ne$	$^{25}Al(p,\gamma)^{26}Si$	$^{31}P(p,\gamma)^{32}S$	$^{36}Ar(p,\gamma)^{37}K$
$^{15}O(\alpha,\gamma)^{19}Ne$	$^{19}Ne(p,\gamma)^{20}Na$	$^{22}Mg(p,\gamma)^{23}Al$	$^{26}Al^{g}(p,\gamma)^{27}Si$	$^{31}P(p,\alpha)^{28}Si$	$^{35}K(p,\gamma)^{36}Ca$
$^{16}O(p,\gamma)^{17}F$	$^{20}Ne(p,\gamma)^{21}Na$	$^{23}Mg(p,\gamma)^{24}Al$	$^{27}Al(p,\gamma)^{28}Si$	$^{30}S(p,\gamma)^{31}Cl$	$^{39}Ca(p,\gamma)^{40}Sc$
$^{16}O(\alpha,\gamma)^{20}Ne$	$^{20}Ne(\alpha,\gamma)^{24}Mg$	$^{24}Mg(p,\gamma)^{25}Al$	$^{27}Al(p,\alpha)^{24}Mg$	$^{31}S(p,\gamma)^{32}Cl$	$^{40}Ca(p,\gamma)^{41}Sc$
$^{17}O(p,\gamma)^{18}F$	$^{21}Ne(p,\gamma)^{22}Na$	$^{24}Mg(\alpha,\gamma)^{28}Si$	$^{26}Si(p,\gamma)^{27}P$	$^{32}S(p,\gamma)^{33}Cl$	
$^{17}O(p,\alpha)^{14}N$	$^{22}Ne(p,\gamma)^{23}Na$	$^{25}Mg(p,\gamma)^{26}Al^{t}$	$^{27}Si(p,\gamma)^{28}P$	$^{31}Cl(p,\gamma)^{32}Ar$	
$^{18}O(p,\gamma)^{19}F$	$^{22}Ne(\alpha,\gamma)^{26}Mg$	$^{25}Mg(p,\gamma)^{26}Al^{g}$	$^{28}Si(p,\gamma)^{29}P$	$^{32}Cl(p,\gamma)^{33}Ar$	
$^{18}O(p,\alpha)^{15}N$	$^{22}Ne(\alpha,n)^{25}Mg$	$^{25}Mg(p,\gamma)^{26}Al^{m}$	$^{29}Si(p,\gamma)^{30}P$	$^{35}Cl(p,\gamma)^{36}Ar$	

- Processing data sets for use in astrophysical models
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Astrophysics Reactions

Physics Letters B 751 (2015) 311–315

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The first science result with the JENSA gas-jet target: Confirmation and study of a strong subthreshold $^{18}F(p,\alpha)^{15}O$ resonance

CrossMark

D.W. Bardayan [a,b,*], K.A. Chipps [b,c,d], S. Ahn [c,e], J.C. Blackmon [f], R.J. deBoer [a], U. Greife [d], K.L. Jones [c], A. Kontos [e], R.L. Kozub [g], L. Linhardt [f], B. Manning [h], M. Matoš [b,c], P.D. O'Malley [a], S. Ota [h], S.D. Pain [b], W.A. Peters [b,c], S.T. Pittman [b,c], A. Sachs [c], K.T. Schmitt [b,c], M.S. Smith [b], P. Thompson [c]

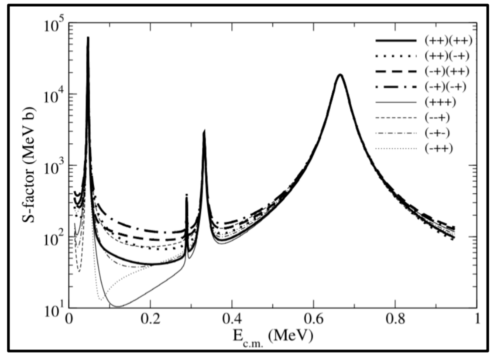

Table 2
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29(3)	6.439(3)	1^-	$< 3.8 \times 10^{-19}$[b]	220
47(3)	6.457(3)	3^{+}[a]	$< 2.1 \times 10^{-13}$	1.3[a]
289(3)	6.699(3)	5^{+}[a]	$< 2.4 \times 10^{-5}$[a]	1.2[a]
332(2)	6.742(2)	3^-	2.22×10^{-3}	5.2[a]
664.7(16)	7.0747(17)	3^+	15.2	23.8
1461(19)		1^+	55	347

[a] Adopted from mirror level.
[b] Based on assumed reduced proton width.

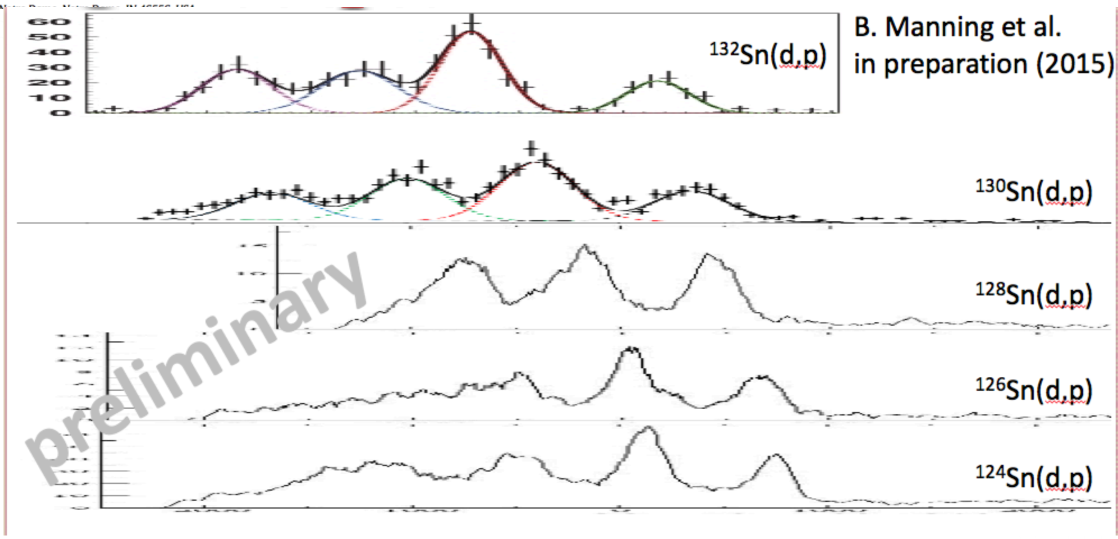


Table 5.1: Spectroscopic factors of the three single-neutron states populated by the (d,p) reaction on neutron-rich tin isotopes. For completeness, the reanalysis of the candidates for the $2f_{7/2}$ states in ^{131}Sn and ^{133}Sn are included. The values were extracted using the DWBA and FR-ADWA formalisms. The liste[illegible] uncertainties include only experimental uncertainties. Values extracted [illegible] FR-ADWA-CH are considered the most reliable and are listed in [illegible].

preliminary

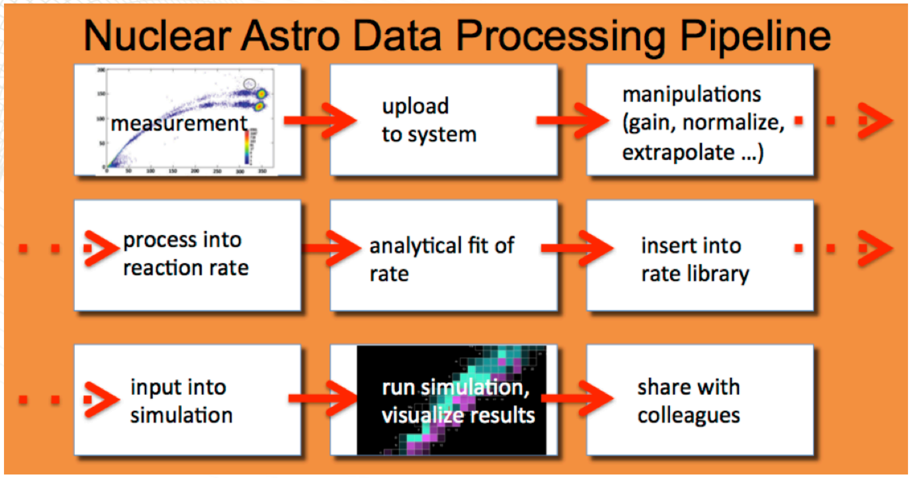
			Spectroscopic Factor[illegible]		
^AX	E_x (keV)	$n\ell j$	DWBA	FR-[illegible]-RD	FR-ADWA-CH
^{125}Sn	2769	$2f_{7/2}$	0.40 ± [illegible]	[illegible]36 ± 0.03	**0.39 ± 0.03**
	3385	$3p_{3/2}$	[illegible]	0.24 ± 0.02	**0.29 ± 0.03**
	3998	$3p_{1/2}$	[illegible]	0.34 ± 0.04	**0.42 ± 0.05**
^{127}Sn	2705	[illegible]	[illegible] ± 0.07	0.49 ± 0.07	**0.54 ± 0.08**
	3325	[illegible]	[illegible].35 ± 0.04	0.23 ± 0.03	**0.27 ± 0.03**
	[illegible]	[illegible]	0.70 ± 0.06	0.43 ± 0.04	**0.49 ± 0.04**
^{129}Sn	2705	$2f_{7/2}$	0.72 ± 0.09	0.67 ± 0.09	**0.75 ± 0.10**
	3317	$3p_{3/2}$	0.39 ± 0.05	0.24 ± 0.03	**0.29 ± 0.04**
	3913	[illegible]	[illegible]	[illegible]	**[illegible]6 ± 0.07**
^{131}Sn	2628	[illegible]	[illegible]	[illegible]	**[illegible]5 ± 0.13**
	3404	[illegible]	[illegible]	[illegible]	**[illegible]5 ± 0.08**
	3986	[illegible]	[illegible]	[illegible]	**[illegible]0 ± 0.14**
	4655	[illegible]	[illegible]	[illegible]	**[illegible]6 ± 0.11**
^{133}Sn	0	$2f_{7/2}$	0.86 ± 0.07	0.90 ± 0.07	**1.00 ± 0.08**
	854	$3p_{3/2}$	0.92 ± 0.07	0.87 ± 0.07	**0.92 ± 0.07**
	1363	$3p_{1/2}$	1.1 ± 0.2	1.3 ± 0.3	**1.3 ± 0.3**
	2005	$2f_{5/2}$	1.5 ± 0.3	1.1 ± 0.3	**1.3 ± 0.3**

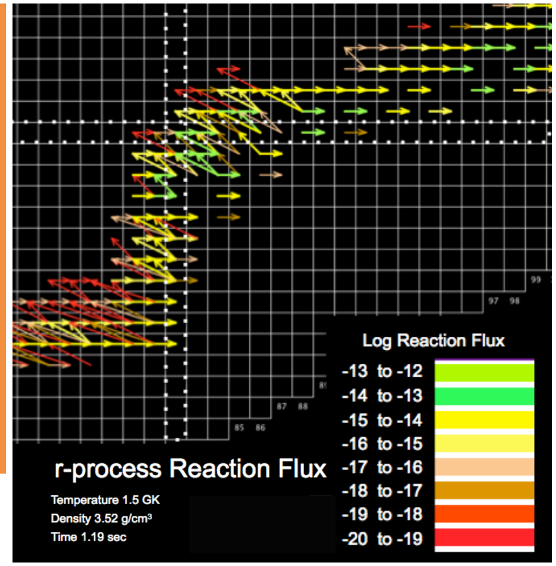
B. Manning et al.
in preparation (2016)

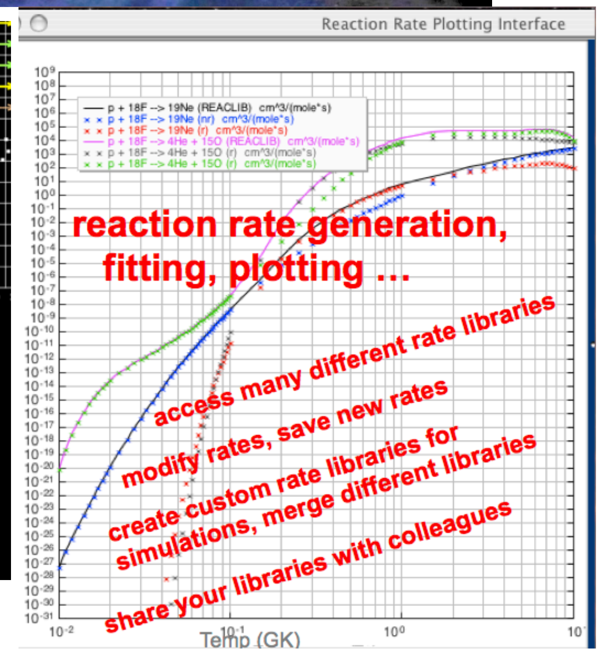
- Assessing structure and reaction information for crucial reactions
  - Relevant for explosive burning in the rp-process [$^{20}Ne(p,d)$ for $^{18}F(p,\alpha)$]
  - Relevant for neutron captures on exotic Sn nuclei in supernovae [$^{124,126,128,130,132}Sn(d,p)$ for $^{124,126,128,130,132}Sn(n,\gamma)$]

Online Software Systems

NUCASTRODATA.ORG



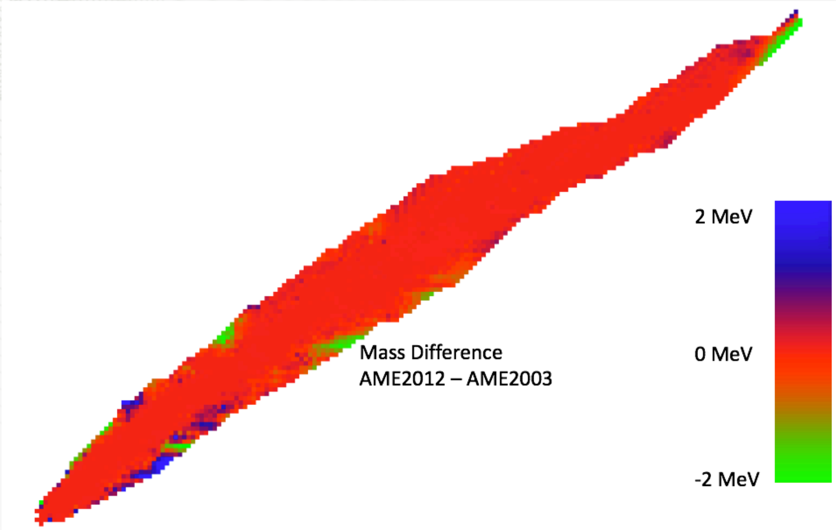


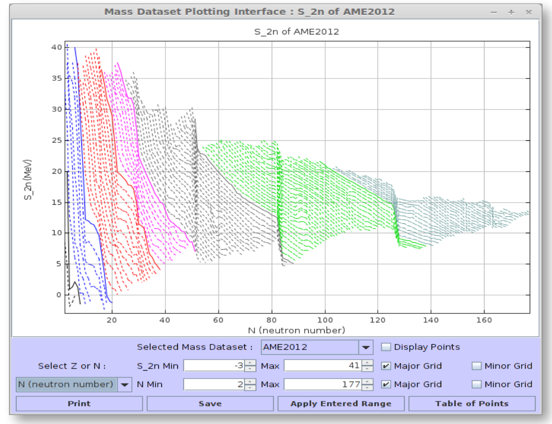


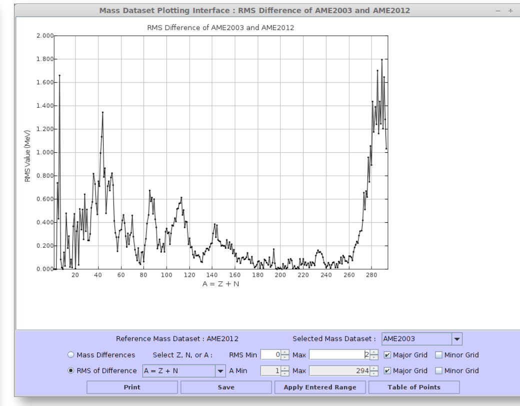
- Computational Infrastructure for Nuclear Astrophysics
  - CINA streamlines the incorporation of the latest NUCLEAR DATA into astro simulations
  - Accessible via an easy-to-use, web-deliverable, cross-platform Java application
  - Used by researchers in 160 institutions in 35 countries
  - Enables uploading, modification, processing, storage, management, visualization, sharing of nuclear information for astrophysics studies
  - Users request new features and tools
  - Simulation results routinely used in beam time proposals by experimentalists

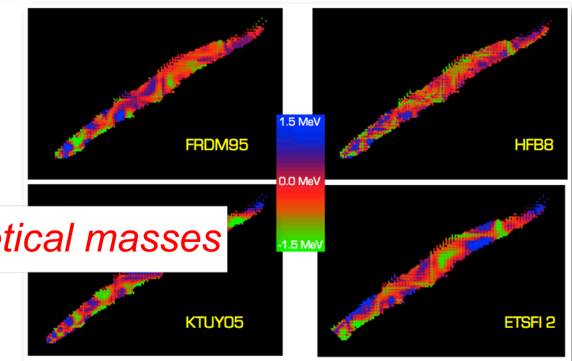
Online Software Systems

nuclearmasses.org









- Nuclear Mass Toolkit
  - Enables quick comparison of *measured, compiled, evaluated, & theoretical masses*
  - Users can quickly share mass data sets
  - Custom 1D and 2D visualizations with a few mouse clicks
- New Atomic Mass Evaluation effort (IMP Lanzhou) has requested special tools
  - creation of new data space to enable AME collaborators to share files
  - new visualization tools for AME collaborators
  - enable mass values to be tagged with comments by AME collaborators
  - pop-up graphs of previous mass values of any chosen nuclide
  - upload additional theory mass tables
  - upload additional nuclear mass references

OAK RIDGE National Laboratory

Budget Situation

- Recent cut in ORNL Data Program funding
- Can no longer support
  - Chris Smith (Postmasters) – XUNDL 0.2 FTE, Astro Reactions 0.8 FTE
  - Eric Lingerfelt (Staff) – Software (0.3 FTE)
  - Shisheng Zhang (Visiting Faculty Subcontractor) – Astro Reactions 0.4 FTE
- Astro and Software activities *significantly reduced* or *nearly terminated* …
  - Assessing reaction and structure info critical for stellar explosion studies
  - Determining rates from USNDP and other data sets
  - Calculating rates with theoretical models
  - Updating / improving online software systems input
  - Maintaining codes and systems
  - Developing new user-requested features
- Requested funds to partially gain back these capabilities