TUNL Contributions in the US Nuclear Data Program

Nuclear Data Evaluation Program

J.H. Kelley, H.R. Weller, Jim Purcell, and
Grace Sheu, Elaine Kwan (50% NNSA)

Program on Preequilibrium Phenomenology

Constance Kalbach Walker

Nuclear Structure Evaluation
TUNL Nuclear Data Evaluation Project
Kelley, Weller

- 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
- Web interface for A=3-20 Information

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Evaluation Activities

- Energy Levels of Light Nuclei
  - Follow style of Fay Ajzenberg-Selove
  - Broad scope of reactions is included – discussion format.
  - Adopted levels/gammas, Energy Level Diagrams
- ENSDF
  - More rigorous information required
  - Better documentation of original sources
  - reaction data sets/decay data sets
  - Adopted levels/gammas, decay widths, etc.

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Recent Evaluation Activities

- Other work in progress:
  - *Energy Levels of Light Nuclei: A=11-13*
    - Soon release of *A=11* preprint
  - Review draft of *A=3* review for NPA publication
    - http://www.tunl.duke.edu/~gsheu/03.pdf
    - Publish within a year
- Web
  - compilation of *A=3-20* Decay information
    - β-decay
    - Particle decay (unbound g.s.)

TUNL Nuclear Data Evaluation Project

Triangle Universities Nuclear Laboratory TUNL Duke UNC NCSU

Energy Levels of Light Nuclei, A = 3 - 20

Nuclear Data Evaluation Project

TUNL Nuclear Data Evaluation

Information on mass chains and nuclides available on this website:

3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20

Group Info
Publications
HTML
General Tables
Level Diagrams
Tables of EL's
ENSDF
Thermal N Capt.
G.S. Decays
NuDat at BNL
Palm Pilot
Useful Links
Citation Examples

Home
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Search:

• 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:

• General Tables: General Tables in HTML for A = 5 - 10 nuclei.

• 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:

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

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

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

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

• Palm Pilot Physics Page: Links to Palm applications and databases that are of interest to the Nuclear Physics community.

Helpful links:

• Links Important links to the National Nuclear Data Center, online nuclear physics journals, and other useful sites.

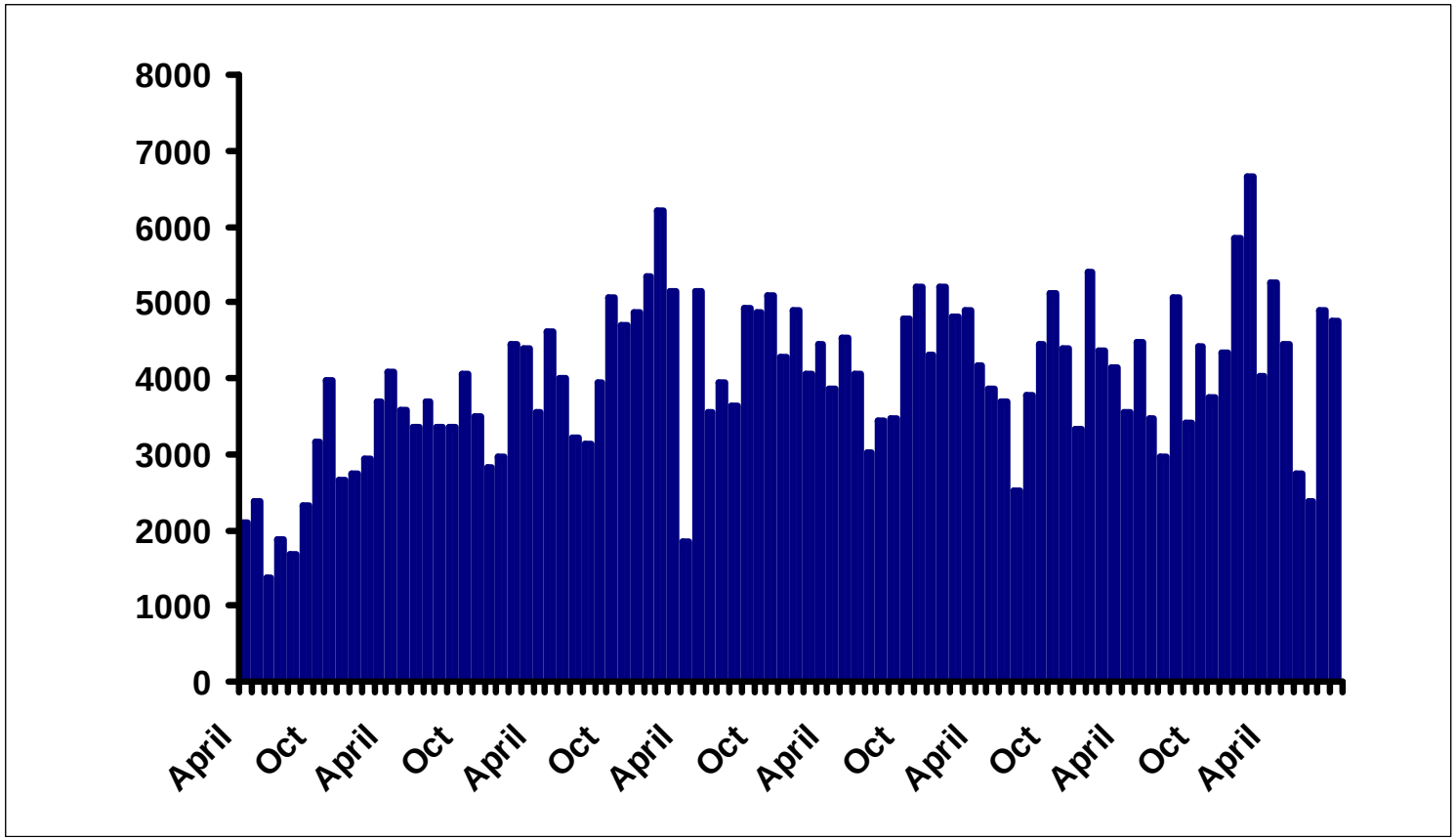
• Citation examples A brief listing of examples of how to format your bibliography, references or citations from the information you obtain from our website.

TUNL Nuclear Data Evaluation Project

TUNL XUNDL Contributions

- Responsible for A=2-20
- 36 Data Sets finished so far since April

WWW usage (April 02-present)



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

New server April 05/partial records

History Lesson

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PHYSICS LETTERS B

Physics Letters B 560 (2003) 31–36

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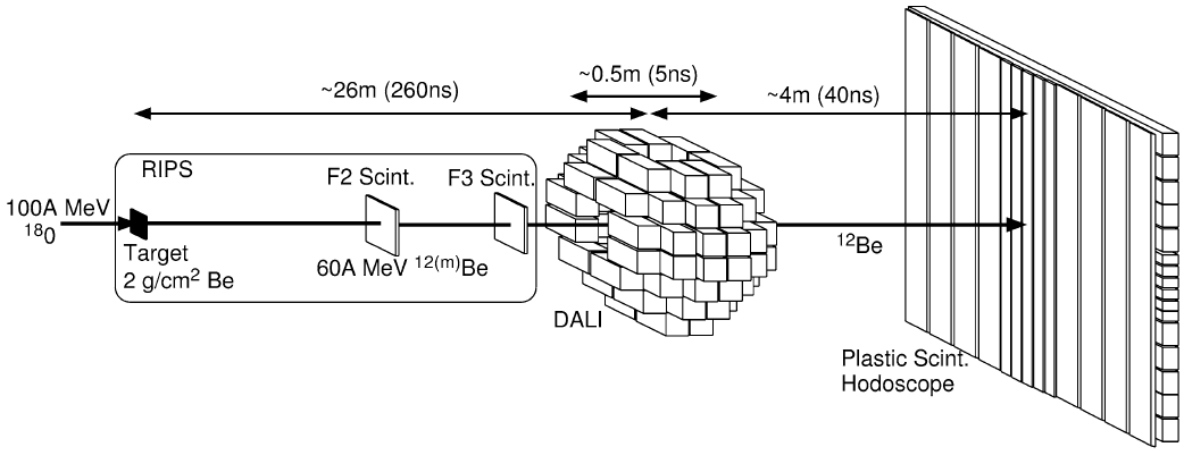
Isomeric 0^+ state in ^{12}Be

S. Shimoura [a,*], A. Saito [b], T. Minemura [c], Y.U. Matsuyama [b], H. Baba [b], H. Akiyoshi [c], N. Aoi [d], T. Gomi [b], Y. Higurashi [b], K. Ieki [b], N. Imai [d], N. Iwasa [e], H. Iwasaki [a], S. Kanno [b], S. Kubono [a], M. Kunibu [b], S. Michimasa [a], T. Motobayashi [b], T. Nakamura [f], H. Sakurai [d], M. Serata [b], E. Takeshita [b], S. Takeuchi [b], T. Teranishi [a], K. Ue [a], K. Yamada [b], Y. Yanagisawa [c], M. Ishihara [c], N. Itagaki [d]



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Physics Letters B 654 (2007) 87–91

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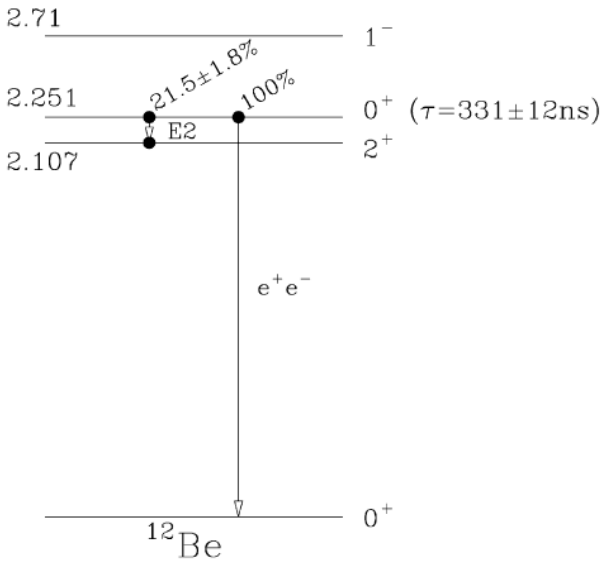


Lifetime of the isomeric 0_2^+ state in ^{12}Be

PHYSICAL REVIEW C VOLUME 18, NUMBER 6 DECEMBER 1978

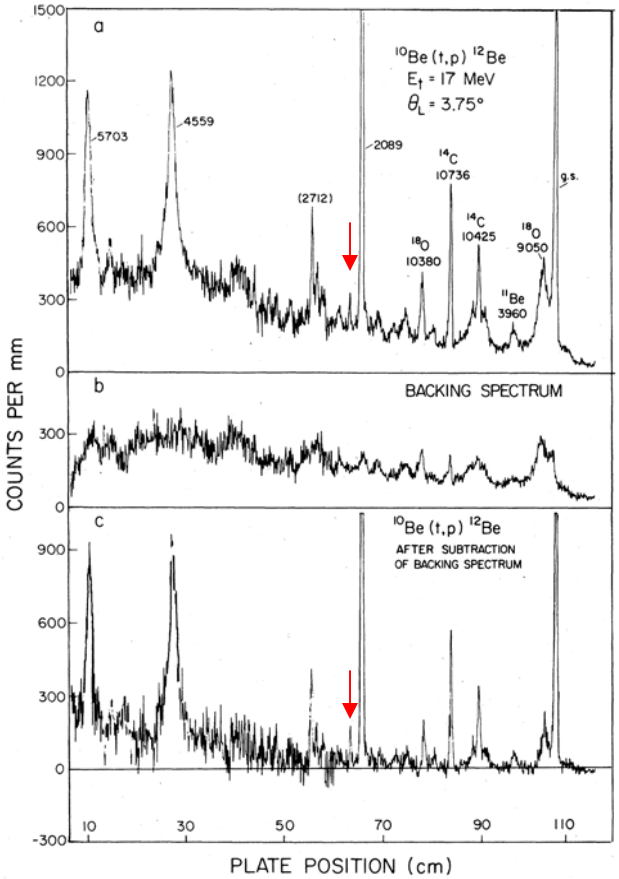
Mass and excited states of ^{12}Be

D. E. Alburger
Brookhaven National Laboratory, Upton, New York 11973

S. Mordechai, H. T. Fortune, and R. Middleton
Physics Department, University of Pennsylvania, Philadelphia, Pennsylvania 19104

(Received 9 August 1978)

The ^{10}Be$(t,p)^{12}$Be reaction has been studied with a 94% enriched ^{10}BeO target, a 17-MeV triton beam, and a multiangle magnetic spectrograph. Proton groups from the (t,p) reaction on ^{12}C and ^{16}O in the target served for energy calibration. An average of data at four angles gives a Q_0 value of -4809 ± 15 keV, from which the mass excess of ^{12}Be is calculated to be $25{,}077.5 \pm 15$ keV. Excited states of ^{12}Be are found at 2089 ± 20, (2712 ± 20, tentative), 4559 ± 25, and 5703 ± 25 keV. The mass excess of ^{12}Be, plus earlier data for $A = 12$, $T = 2$, gives a value of $d = +2.8 \pm 8.6$ keV for the coefficient of the cubic term in the isobaric multiplet mass equation.



In addition to the weak peak at a plate position of 57 cm in Fig. 1, tentatively assigned to a ^{12}Be level at 2712 keV, there is an even weaker line at 65 cm which does not appear in the background spectrum. We do not claim that this belongs to the ^{10}Be$(t,p)^{12}$Be reaction but if it did the peak would correspond to an energy level in ^{12}Be at about 2240 keV having a relative (t,p) cross section of ~6 in the units of Table I. If other excited states exist in ^{12}Be below 5.8 MeV they are not populated in this experiment with as much as 5% of the ground-state strength.

TUNL Program on Preequilibrium Phenomenology

(Constance Kalbach Walker)

Program involves development of

- Exciton preequilibrium model and code
- Additional direct reaction models for complex particle channels

(Current version is PRECO-2006)

2008-2009 Progress

- Continued developing model for projectile breakup for d, He-3, and α induced reactions
  - Model complete
  - Implemented in subroutine
  - Being fine-tuned using data comparisons

Important for finalizing preequilibrium description of complex-particle-induced rxns

Future Plans

- Complete development and implementation of breakup model.
  Part of CRP on FENDL-3 (Fusion Evaluated Nuclear Data Library). Deuteron breakup model is essential for including deuteron induced reactions in data library.
- Other projects as need and opportunity arise.