



Member of the US Nuclear Data Program

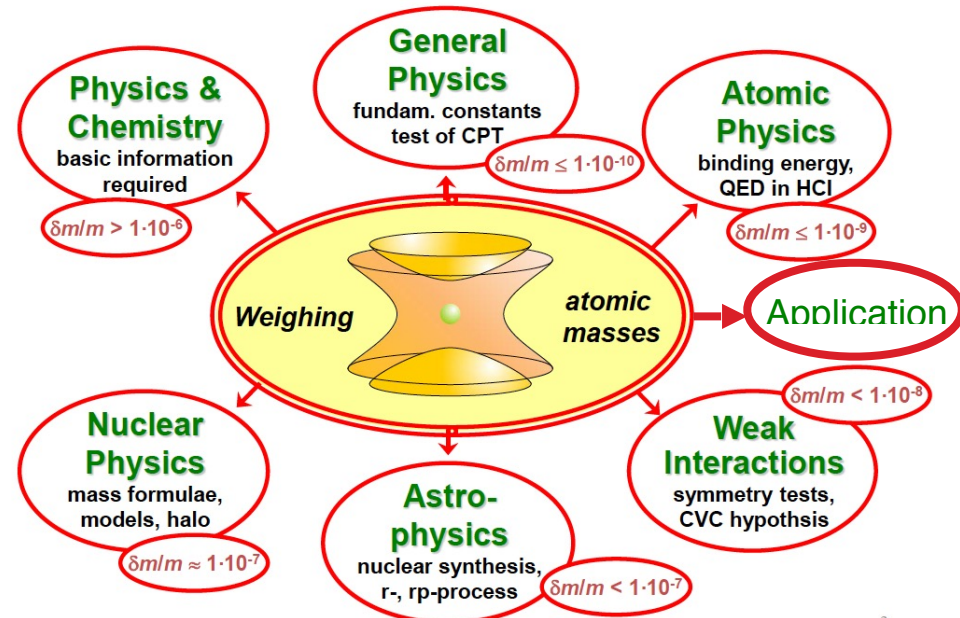
The Atomic Mass Evaluation & NUBASE

on behalf of the AME & NUBASE collaboration

Meng Wang (IMP), G. Audi (CSNSM), F.G. Kondev (ANL), W.J. Huang (CSNSM), S. Naimi (RIKEN) and Xing Xu (IMP)

Atomic Mass Evaluation & NuBase

- ❑ Binding energies
 - ✓ mass models
 - ✓ shell structure
- ❑ Correlations
 - ✓ pairing
 - ✓ p-n
- ❑ Reaction & decay phase space
 - ✓ Q values
 - ✓ decay & reaction probabilities
- ❑ The limits of existence
 - ✓ drip lines
 - ✓ specific configurations and topologies



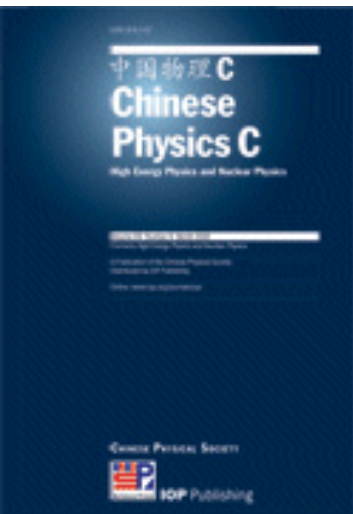
- ❑ combines the experimental results from mass and energy measurements produced in many nuclear physics laboratories using a procedure established by A.H. Wapstra in the early 1950's
 - ✓ recommended (best) values for the atomic masses and their uncertainties
 - ✓ extrapolation to the extremes using the smoothness of the mass surface

AME & NuBase - historical perspective

long & rich history

Ame1955, Ame1961, Ame1964, Ame1971, Ame1977

Ame1983, Ame1993, Ame2003 -> A.H. Wapstra & G. Audi



CPC(HEP & NP), 2012, 36(12): 1603–2014

Chinese Physics C

Vol. 36, No. 12, Dec., 2012

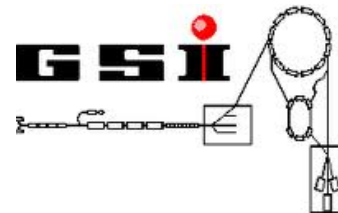
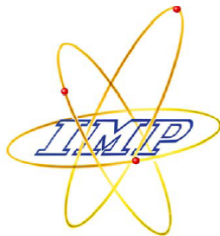
The AME2012 atomic mass evaluation *

(II). Tables, graphs and references

M. Wang^{1,2,3}, G. Audi^{2,§}, A.H. Wapstra^{4,†}, F.G. Kondev⁵, M. MacCormick⁶, X. Xu^{1,7}, and B. Pfeiffer^{8,‡}



Ame2012

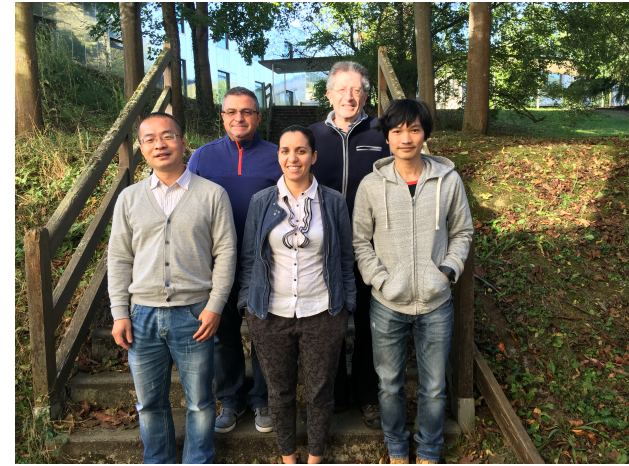
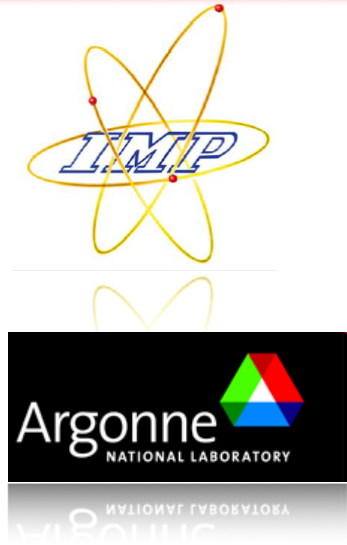
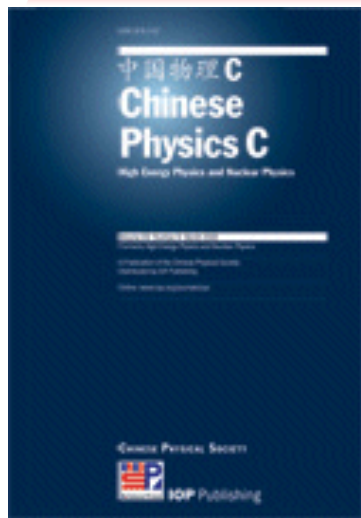


citations: >1750

collaborative effort led by G. Audi



AME2016



Chinese Physics C Vol. 41, No. 3 (2017) 030003

The AME2016 atomic mass evaluation *

Meng Wang (王猛)^{1,2;1)} G. Audi (欧乔治)³ F.G. Kondev⁴ W.J. Huang(黄文嘉)³ S. Naimi⁵ Xing Xu(徐星)

✓ led by M. Wang (AME) and G. Audi (NuBase)

- AME2016: continuing impact of direct mass spectrometry techniques using Penning Traps & Storage Rings spectrometers - high precision & far from stability ... also new data in the region of heavy elements ...



The NUBASE2016 evaluation of nuclear properties*

G. Audi (欧乔治)¹ F.G. Kondev² Meng Wang (王猛)^{3,4;1} W.J. Huang(黄文嘉)¹ S. Naimi⁵

□ basic nuclear level properties of relevance to AME: E_x , J^π , $T_{1/2}$, decay modes: β -n, β -2n, ECp, EC2p,...

□ independently evaluated; based on ENSDF, but includes new data from the most recent references

	ground state		isomer ($T_{1/2} > 100$ ns)	
	NUBASE12	NUBASE16	NUBASE12	NUBASE16
# of cases	3379	3436	1769	1839
stable	286	286	1	1
with J^π	3043 (92%)	3138 (93%)	1647 (93%)	1724 (94%)
with firm J^π	1816 (55%)	1866 (55%)	724 (41%)	747 (41%)
with $T_{1/2}$	3288 (99%)	3371 (100%)		
with $T_{1/2}$ (exp)	2892 (87%)	3027 (90%)	1664 (94%)	1734 (94%)
β^-	1343	1376	205	220
β^+	1236	1259	334	343
α	852	872	194	205
p	63	74	26	27
SF	192	203	40	45
β -n	583	609	20	27
β +p	243	265	28	29



Dissemination

AMDC
Atomic Mass Data Center



This page contains data provided by the **Atomic Mass Data Center**, located at the Institute of Modern Physics, Chinese Academy of Sciences (IMP), Lanzhou, China. Please refer to that web-site for further information about AME and NUBASE.

<https://www-nds.iaea.org/amdc/>

Atomic Mass Evaluation - AME2016

The evaluation has been published in *Chinese Physics C* 41 (2017) 030002 (PDF), 030003 (PDF).

The four main ASCII files of AME2016 are

1. [mass16.txt](#) - atomic masses
2. [mass16round.txt](#) - atomic masses "rounded" version
3. [rct1-16.txt](#) - reaction energies, table 1
4. [rct2-16.txt](#) - reaction energies, table 2

Q-value Calculator (QCalc)

QCalc calculates Q-values for nuclear reactions or decays. It uses mass values from the 2016 Atomic Mass Evaluation by M. Wang *et al*, <http://www.nndc.bnl.gov/qcalc/>

Target(s) <input type="text"/>	Uncertainties
<i>56fe, Fe56, 26056, cr50-fe56</i> <i>use dash for range only</i>	<input checked="" type="radio"/> Standard style
Projectile <input type="text"/>	<input type="radio"/> Nuclear Data Sheets style
<i>4He, He-4, 2-he-4, a, alpha, 2004</i>	
Ejectile <input type="text"/>	
<i>g, n, n+p, 2n+a, 2a+12c (reaction)</i> <i>b-, ec, 2b-, b-n, ecp, 18O (decay)</i>	
<input type="button" value="Submit"/>	<input type="button" value="Reset"/>



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Institute of Modern Physics, Chinese Academy of Sciences

<http://amdc.impcas.ac.cn>

Today is 2017/5/18, Thursday

About the AMDC

Introduction

NUBASE+AME2016

Evaluations

■ AME

■ NUBASE

Registration

Login

Logout

The 2016 Atomic Mass Evaluation (AME2016)

The evaluation has been published in *Chinese Physics C* 41 (2017) 030002 (PDF), 030003 (PDF).

The four main ASCII files of AME2016 are

- [mass16.txt](#) - atomic masses
- [mass16round.txt](#) - atomic masses "Rounded" version
- [rct1-16.txt](#) - reaction energies, table 1, S(2n), S(2p), Q(a), Q(2B-), Q(ep), Q(B- n)
- [rct2-16.txt](#) - reaction energies, table 2, S(n), S(p), Q(4B-), Q(d,a), Q(p,a), Q(n,a)
- [covariance.txt](#) - Variances and Covariances of primary nuclides
- [known_deficiencies.txt](#) - list of corrections of the previous version

- ❑ the end users are recommended to use the data in the [rct1-16.txt](#) and [rct2-16.txt](#) files
 - ✓ take into account correlations (explained in the 2nd AME paper)
 - ✓ uncertainties for the most precise values are listed as '0.00' - the end users need to calculate them using the correlation matrix (2nd AME paper) and non-rounded mass data ([mass16.txt](#))

