Argonne NATIONAL LABORATORY

Member of the US Nuclear Data Program

Argonne Nuclear Data Program

U.S. DEPARTMENT OF ENERGY | Office of Science

Nuclear Physics

Core ND activities

- nuclear structure and decay data evaluations - **ENSDF**
- evaluation of masses and other nuclear physics properties - **AME & NuBase**
- evaluations in support of **IAEA-led** projects & **topical evaluations** with leading scientists in the field (nuclear isomers, medical isotopes, FP data, etc.)

Other ND research activities

- intersections between basic & applied nuclear physics & astrophysics
- targeted experiments (funded by DOE/SC FOAs) & research activities at **ANL (ATLAS & CARIBU), MSU (FRIB), RIKEN, GSI** and other NP facilities

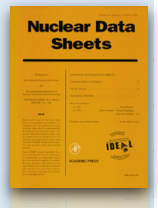
technical presentations at the USNDP Nuclear Structure WG meeting @ ANL Nov. 16-18, 2022

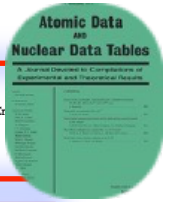
ENSDF Evaluations

International Atomic Energy Agency
Nuclear Data Services
Provided by the Nuclear Data Section

- 17 mass-chains assigned to ANL ~260 nuclides

A	NDS	Evaluator	
109	NDS 137 (2016)	S. Kumar, J. Chen & F.G. Kondev	
110	NDS 113 (2012)	G. Gurdal & F.G. Kondev	
176	NDS 107 (2006)	M.S. Basunia	
177	NDS 159 (2019)	F.G. Kondev	
178	NDS 110 (2009)	E. Browne	
179	NDS 110 (2009)	C.M. Baglin	
188	NDS 150 (2018)	F.G. Kondev, D. Hartley, S. Juutinen	
199	NDS 108 (2007)	B. Singh	
200	NDS 108 (2007)	F.G. Kondev & S. Lalkovski	FY22
201	**NDS 108 (2007)**	**F.G. Kondev**	FY21
202	NDS 109 (2008)	S. Zhu & F.G. Kondev	FY23
203	**under review**	**F.G. Kondev**	FY20
204	NDS 111 (2010)	C.J. Chiara & F.G. Kondev	
205	NDS 166 (2020)	F.G. Kondev	FY19
206	NDS 109 (2008)	F.G. Kondev	
207	NDS 112 (2011)	F.G. Kondev & S. Lalkovski	
208	NDS 108 (2007)	M. Martin (ORNL)	
209	NDS 126 (2015)	J. Chen & F.G. Kondev	





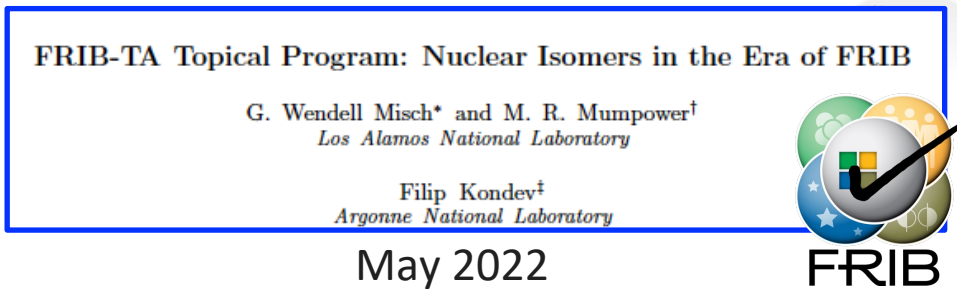
Atomic Data and Nuclear Data Tables 103–104 (2015) 50–105

Configurations and hindered decays of K isomers in deformed nuclei with $A > 100$

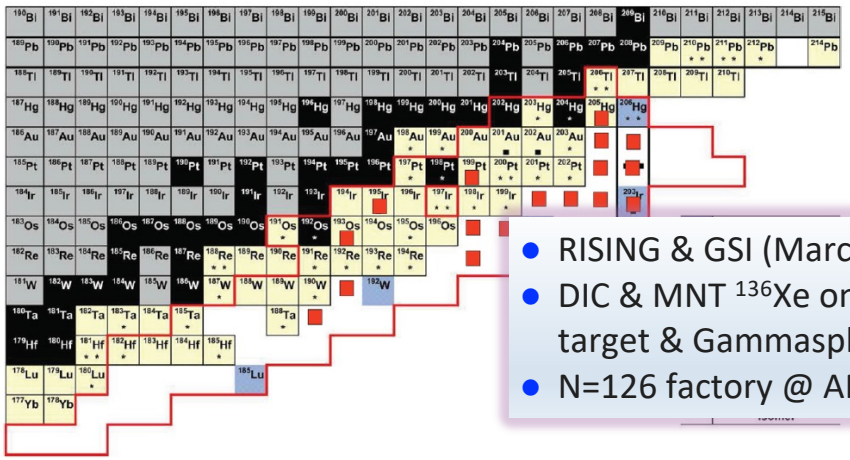
F.G. Kondev[a,*], G.D. Dracoulis[b,1], T. Kibédi[b]

both are highly cited

high-K rules in beta-decay (deformed nuclei)



May 2022



- RISING & GSI (March 2006)
- DIC & MNT ^{136}Xe on ^{210}PB target & Gammasphere
- N=126 factory @ ANL

AME & NUBASE

DE GRUYTER Pure Appl. Chem. 2022; 94(5): 573–600

IUPAC Technical Report

Thomas Prohaska*, Johanna Irrgeher, Jacqueline Benefield, John K. Böhlke, Lesley A. Chesson, Tyler B. Coplen, Tiping Ding, Philip J. H. Dunn, Manfred Gröning, Norman E. Holden, Harro A. J. Meijer, Heiko Moossen, Antonio Possolo, Yoshio Takahashi, Jochen Vogl, Thomas Walczyk, Jun Wang, Michael E. Wieser, Shigekazu Yoneda, Xiang-Kun Zhu and Juris Meija

Standard atomic weights of the elements 2021 (IUPAC Technical Report)

https://doi.org/10.1515/pac-2019-0603
Received June 23, 2019; accepted January 9, 2022

OPEN ACCESS
IOP Publishing | Bureau International des Poids et Mesures Metrologia
Metrologia 55 (2018) 125–146 https://doi.org/10.1088/1681-7575/aa99bc

Data and analysis for the CODATA 2017 special fundamental constants adjustment*

Peter J Mohr, David B Newell, Barry N Taylor and Eite Tiesinga

AME2020 & NUBASE2020

IOP science

since March 5, 2021

- **>30000** downloads
- **>650** citations

nuclear structure
nuclear astrophysics
nuclear data (ENSDF & ENDF)
applications (GEANT & MCNP)

FY22

Compilations	Evaluations
100	60

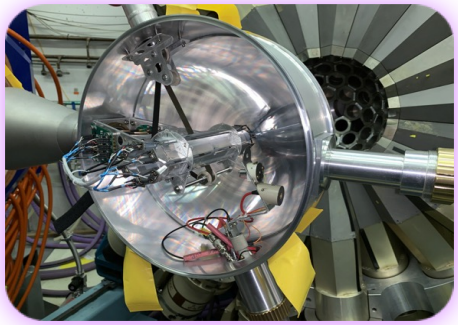
next tables planed for 2024

Other ND activities

Targeted Experiments

- ATLAS @ CARIBU facilities
- state-of-the-art detector equipment

3 funded FOA projects (term 3-5 years)
DOE/SC/NP and NNSA/NA-22



novel ion-counting FPY measurements @CARIBU

new decay-data station @Gammasphere

collaboration activities (FY22-FY23): hosted Prof. S. Lalkovski (USofia) – Fulbright Fellow - ND

International Atomic Energy Agency
Nuclear Data Services
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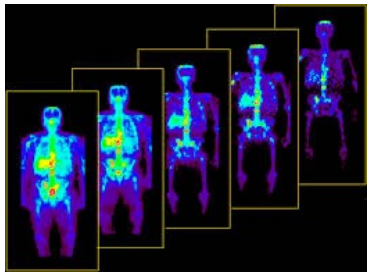
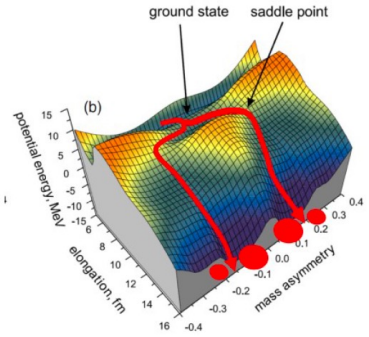


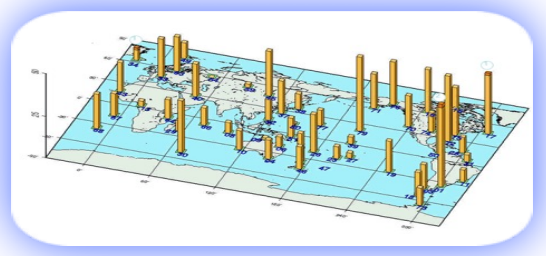
CRP-MI production

POC: R. Capote



POC: R. Capote

CRP- FPY: F. Tovesson, G. Savard and F.G. Kondev



Decay DL: Monitoring applications

POC: V. Dimitriou

ANL-ND near-future (5-7 years) vision

- **Continue contributing to ENSDF - top priority since it is struggling** – maintain closer connections with ATLAS/CARIBU & FRIB research communities

- **Continue AME & NuBase collaboration activities**
  - maintain the currency (4-5 years cycle) and quality

- **Continue collaborations with IAEA-NDS, other USNDP groups & broader nuclear physics community on Nuclear Data *topical evaluations* – impact in high-priority areas**

- **Continue ND experimental activities** - nuclear structure, masses, astrophysics & intersections with the applied programs
  - **ATLAS & CARIBU:** emphasis on properties of neutron-rich nuclei in the deformed, light rare-earth region, heavy nuclei & nuclear isomers
    - **N=126 factory:** the region south of ^{208}Pb - overlaps with the ND evaluation responsibilities
    - **nuCARIBU:** contributions to ND FOA's and other InterAgency ND projects
  - **MSU (FRIB), RIKEN, GSI (ILIMA):** collaborative research at the forefront of nuclear science