



Argonne Nuclear Data Program



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Nuclear Physics

Core ND activities

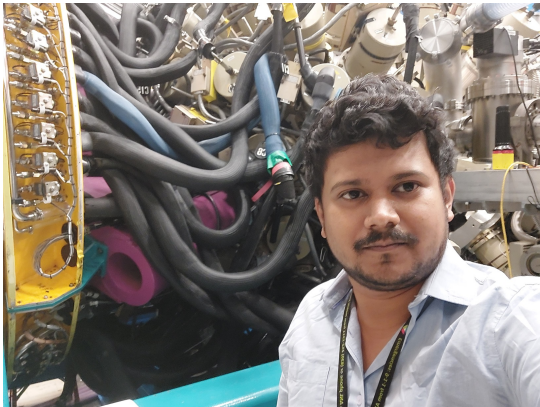
- ⇒ nuclear structure and decay data evaluations - **ENSDF**
- ⇒ evaluation of masses and other nuclear physics properties - **AME & NuBase**
- ⇒ evaluations in support of **IAEA-led projects & topical evaluations** with leading scientists in the field (nuclear isomers, medical isotopes, FP data, etc.)

Other ND research activities

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

FY2023 ANL Personnel & Funding Profile

- ⇒ DOE/SC Nuclear Physics (base) funding
 - one ANL staff - supported at **1 FTE level** since 2001 - currently at **0.60 FTE** due to flat-flat and reduced ND budgets
- ⇒ FOA InterAgency Nuclear Data - DOE/SC/NP & NNSA-NA22
 - provided additional support to the ANL staff - no funding for FY24 and beyond
 - one post-doc until October 2023 & one new post-doc expected to join



- Dr. Stefan Lalkovski (University of Sofia, Bulgaria) - **Fulbright Fellow in Nuclear Data** - 6 months during FY22-FY23 (no cost to USNDP)
 - ⇒ ENSDF & decay data evaluations



- Dr. Soumen Nandi - post-doc until October 2023
 - ⇒ FP decay data experiment & evaluation

- ⇒ FOA InterAgency Nuclear Data funded projects (PI Guy Savard- ANL)
 - 2 post-docs

ENSDF Evaluations



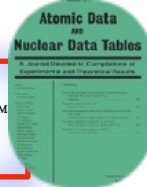
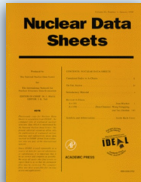
International Atomic Energy Agency

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	in press	F.G. Kondev ← FY22
201	NDS 187 (2023)	F.G. Kondev ← FY21
202	submitted	F.G. Kondev ← FY23
203	NDS 177 (2021)	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



IOP Publishing

Reports on Progress in Physics

Review of metastable states in heavy nuclei

G D Dracoulis^{1,4}, P M Walker² and F G Kondev³



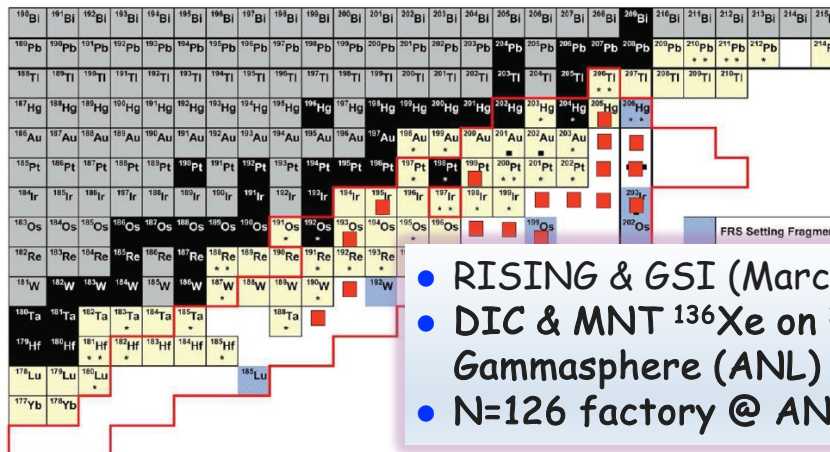
both are highly cited

FRIB-TA Topical Program: Nuclear Isomers in the Era of FRIB

G. Wendell Misch* and M. R. Mumpower[†]
Los Alamos National Laboratory

arXiv:2304.10608

Filip Kondev[‡]
Argonne National Laboratory



- RISING & GSI (March 2006)
- DIC & MNT ¹³⁶Xe on ²¹⁰Pb@ Gammasphere (ANL)
- N=126 factory @ ANL

⇒ struggling to fulfill commitments
A=176, 199 & 208 ~17 years old

Collaborations with IAEA & broader ND community

Eur. Phys. J. A (2023) 59:78
<https://doi.org/10.1140/epj/s10050-023-00969-x>

THE EUROPEAN
PHYSICAL JOURNAL A

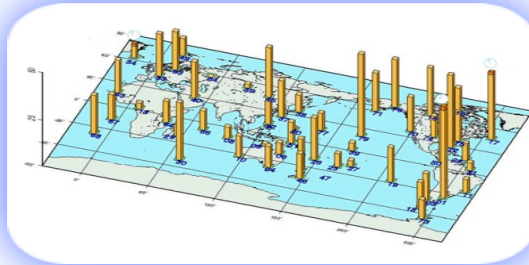


Review

Improving fission-product decay data for reactor applications: part I—decay heat

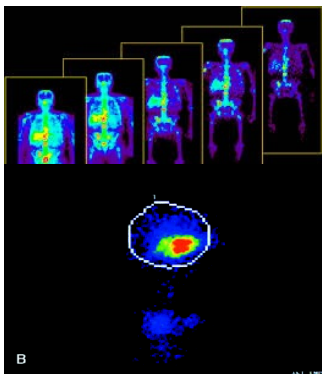
A. L. Nichols^{1,2}, P. Dimitriou^{3,4}, A. Algora^{4,5}, M. Fallot⁶, L. Giot⁶, F. G. Kondev⁷, T. Yoshida⁸, M. Karny⁹,
G. Mukherjee¹⁰, B. C. Rasco¹¹, K. P. Rykaczewski¹¹, A. A. Sonzogni¹², J. L. Tain⁴

⇒ recommended nuclear data and future data needs



Decay Data Library for Monitoring Applications

⇒ 40 radionuclides in the FP region
⇒ ANL staff is technical coordinator



IAEA-CRP on Medical Isotopes production

⇒ 3 review articles were published - recommended cross sections & decay data
⇒ August 2023 TM meeting at IAEA - discussion about new data needs



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Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

journal homepage: www.elsevier.com/locate/nima



Branching ratio and γ -ray emission probabilities in the decay of the $J^\pi = 13/2^+$ isomer in ^{197}Hg

O. Lebeda^a, F.G. Kondev^{b,*}, J. Červenák^a

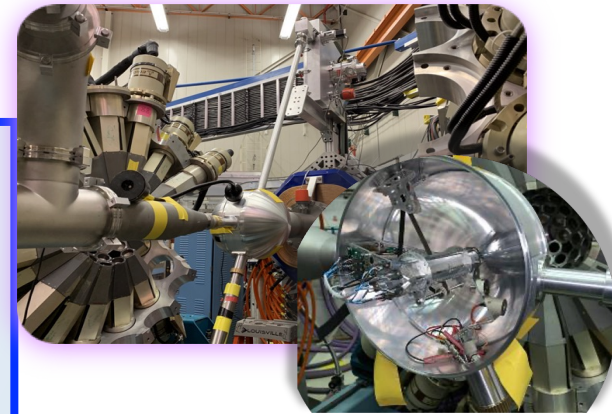
resolved ND discrepancies for the theranostic (Auger emitter & SPECT) $^{197\text{m}}\text{Hg}$ radionuclide

Other ND activities



Targeted Experiments
⇒ ATLAS @ CARIBU facilities
⇒ state-of-the-art equipment

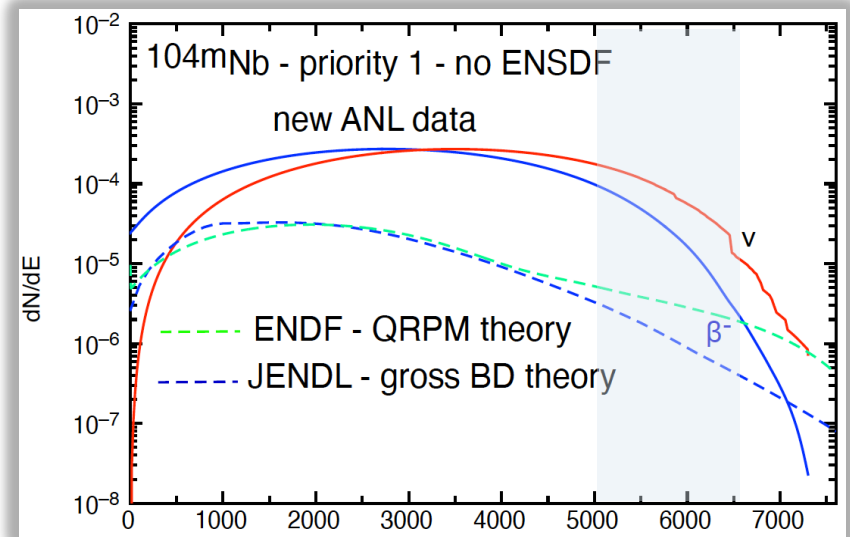
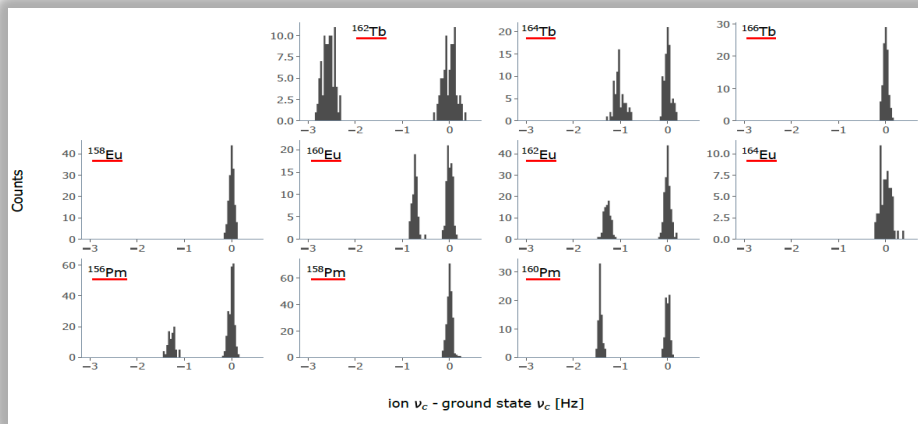
4 funded FOA projects
DOE/SC/NP and NNSA/NA-22



novel ion-counting FPY program @CARIBU
⇒ ground states & isomers (IR)

new decay-data station @Gammasphere
⇒ improving FP & antineutrino decay data

collaboration between ANL & LLNL



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

High Priority Activities - NSAC ND & NP LRP recommendations

- Continue contributing to **ENSDF** - top priority since **it is struggling** - maintain closer connections with ATLAS/CARIBU, FRIB and broader NP community
- Continue contributing to **AME & NuBase** - our contribution is essential
⇒ maintaining the **currency** and **quality** is high priority - 4-5 years cycle
→ **Require restoration of 1 FTE support to the ANL ND staff**

Other Priority Activities

- 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 Nuclear Data evaluation responsibilities
 - **nuCARIBU**: contributions to ND FOA's and other InterAgency ND projects
- ⇒ **MSU (FRIB), RIKEN & others**: collaborative research at the forefront of nuclear science