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Member of the US Nuclear Data Program

Argonne Nuclear Data Program

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Program Overview (FY07)

- ❑ **Nuclear Data *Compilations & Evaluations* (80 %)**
 - ✓ nuclear structure & decay data compilations & evaluations for the International NSDD network (ENSDF & NDS)
 - ✓ decay data evaluations for DDEP & IAEA-CRP on “*Updated Decay Data Library for Actinides*”
- ❑ **Complementary ND *Research* Activities (20 %)**
 - ✓ basic and applied nuclear physics & astrophysics
- ❑ **Effort & Funding - 1.0 FTE staff & 0.5 FTE post-doc**

2007 USNDP Meeting, BNL, November 7-9, 2007

Compilation & Evaluation Activities

❑ ENSDF Evaluations (NSDD)

- ✓ incorporated reviewer's comments to **A=200** - published in NDS – in collaboration with Dr. S. Lalkovski, Sofia University/ [University of Brighton, UK](#)
- ✓ completed **A=202** (partially PD) and **206**
- ✓ reviewed **A=208** evaluation

❑ Evaluations for IAEA-CRP on “Updated Decay Data Library for Actinides” & DDEP collaboration

- ✓ completed **²⁴⁶Cm** & **²⁰⁶Tl** evaluations - included in “**Mini-Table of Radionuclide**” (CEA/LNE & EDP Science publication)
- ✓ reviewed **²⁴²Am** & **²⁴⁴Am** evaluations
- ✓ significant differences were found between **IAEA-CRP** recommended X-ray & electron data for **²⁰⁶Tl** and what appear in **ENDF/B-VII.0** & **JEFF3.1** – **ENDF/B-VI.8** agrees with the **IAEA-CRP** evaluation - possible reason – treatment of **E0** transitions (see [ANL/NDM-162](#) for details on **²⁰⁶Tl**)

❑ Horizontal Evaluations

- ✓ evaluations of properties of **K-Isomers in deformed nuclei** continue in collaboration with scientists from ANU, Australia

❑ Other (related) Activities

- ✓ participated in the **2nd IAEA-CRP** meeting – activities reported at the WG session
- ✓ represented ANL & US at the **17th NSDD meeting**, St. Petersburg – **action items** on **rule 37** (deformed nuclei) and **Transition Quadrupole Moments** were completed
- ✓ paper on ENSDF has been submitted to **[Nuclear Physics News](#)** – in collaboration with J. Tuli (NNDC) & A. Nichols (IAEA) – **action item from the NSDD meeting**
- ✓ several presentations at NP/ND meetings, including: **ND2007**, **12th International School on Nuclear Physics, Neutron Physics & Applications, 2007 Chicago Town Meeting for the NSAC Long Range Plan, DNP/APS**

IAEA-CRP Measurements Activities

□ Decay Spectroscopy of **Actinide Nuclei** – part of the ANL commitment to **IAEA-CRP** on “*Updated Decay Data Library for Actinides*”

✓ α -, β - and γ -ray decay studies (singles and coincidences) of ^{233}Pa , ^{237}Np , ^{240}Pu , $^{242\text{m}}\text{Am}$, $^{243,244,245,246}\text{Cm}$ & $^{249,250}\text{Cf}$ using unique mass separated sources – reported at the WG meeting

✓ results on ^{240}Pu , ^{244}Cm , ^{246}Cm & ^{250}Cf have been published



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Applied Radiation and Isotopes 65 (2007) 335–340

Measurements of the half-life of ^{246}Cm and the α -decay emission probabilities of ^{246}Cm and ^{250}Cf

F.G. Kondev^{a,*}, I. Ahmad^b, J.P. Greene^b, M.A. Kellett^c, A.L. Nichols^c

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Nuclear Instruments and Methods in Physics Research A 579 (2007) 458–460

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NUCLEAR
INSTRUMENTS
& METHODS
IN PHYSICS
RESEARCH
Section A

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Nuclear Data Research Activities

□ Properties of K-Isomers in the A~180 and 250 mass regions

- ✓ completed studies of ^{174}Lu – PRL/published, Phys. Rev. C/under preparation
- ✓ new results on $^{246,248}\text{Pu}$, $^{250,252}\text{No}$ and ^{256}Rf – in the future emphasis on actinide and SH nuclei

□ Studies of $^{186\text{m}}\text{Re}$ - relevant to nuclear astrophysics - $^{187}\text{Re}/^{187}\text{Os}$ clock – under the auspices of USNDP Nuclear Data for Astrophysics Task Force

- ✓ work continues on elucidating the structure of levels above the $K^\pi=8^+$ isomer ($T_{1/2}\sim 10^5$ y) – initiated a neutron cross section measurements campaign (August, 2007) at the TUNL facility - in collaboration with the TUNL Nuclear Data group

□ Development of Argonne Total Absorption Gamma-ray Spectrometer

- ✓ completed initial tests of the NaI detector (from INL–many thanks to Jerry Cole!)
- ✓ **new ANL LDRD/DCG** (FY08) – emphasis on Nuclear Data needs for neutron-rich FP of relevance to Advanced Fuel Cycle & Nuclear Astrophysics applications – in collaboration with Kim Lister (ANL/PHY) – will utilize the state-of-the-art **CARIBU** RIB facility at ANL
- ✓ student from **Australia** (fully sponsored by **ANSTO/ANU**) will work with us on this project during FY08