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Member of the US Nuclear Data Program

# Argonne Nuclear Data Program

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## Program Overview (FY08)

- ❑ Nuclear Data **Compilations** & **Evaluations** (90 %)
  - ✓ nuclear structure & decay data compilations & evaluations for the International NSDD network (ENSDF & XUNDL)
  - ✓ decay data evaluations for DDEP & IAEA-CRP on “Updated Decay Data Library for Actinides”
- ❑ Complementary ND **Research** Activities (10 %)
  - ✓ basic and applied nuclear physics & astrophysics
- ❑ Effort & Funding - **1.0** FTE staff & **0.2** FTE post-doc

2008 USNDP Meeting, BNL, November 5-7, 2008

# Compilation & Evaluation Activities

## □ ENSDF & XUNDL

- ✓ incorporated reviewer's comments to **A=202 & 206** - published in NDS
- ✓ work in progress **A=177** (FGK), **204** (with C.J. Chiara, ANL-PD), and **209** (with G. Mukherjee, India)
- ✓ since March 2008 – compilations for XUNDL: **Phys. Lett. B & J. Phys. G** (with B. Singh, McMaster University)

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

- ✓ completed **<sup>206</sup>Hg** evaluation; work is continuing on **<sup>243</sup>Cm & <sup>245</sup>Cm** – incorporate new results from measurements carried out at ANL
- ✓ work started on **<sup>209</sup>Tl** and **<sup>209</sup>Pb** (with G. Mukherjee, India)

## □ Horizontal Evaluations

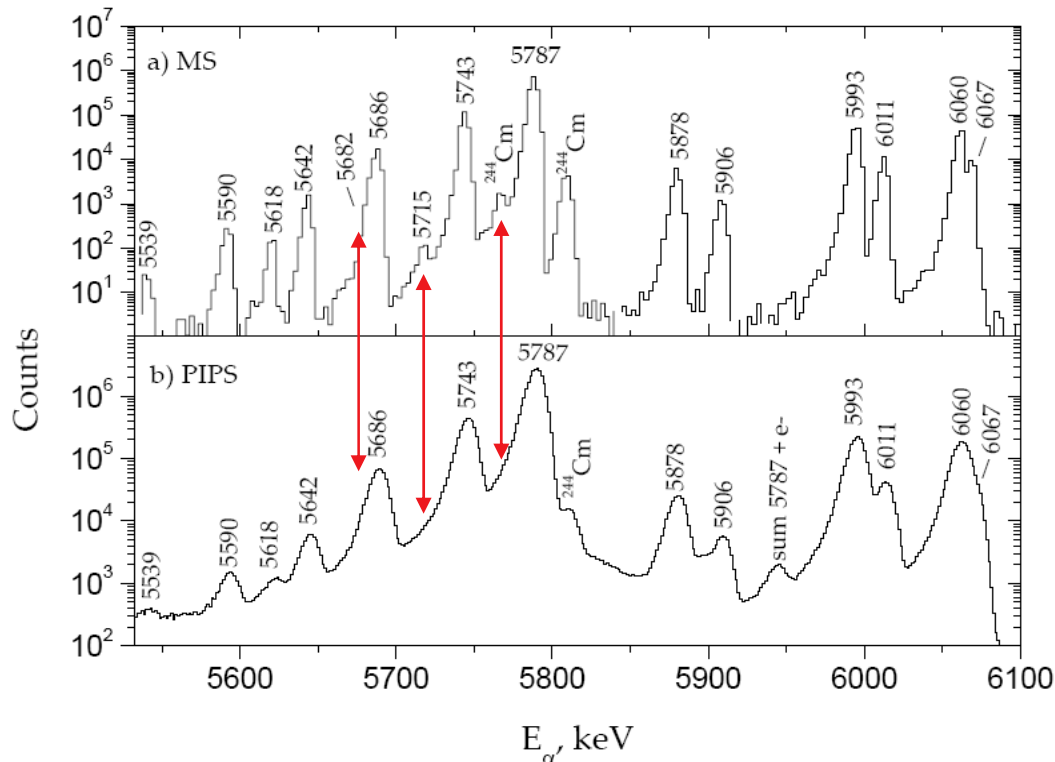
- ✓ evaluations of properties of **K-Isomers in deformed nuclei** continue in collaboration with scientists from ANU, Australia – the progress is slow due to time constraints

## □ Other (related) Activities

- ✓ lecturer & student participated in the activities of the 3<sup>rd</sup> **IAEA/ICTP** organized Workshop in Trieste
- ✓ article on ENSDF has been published in **Nuclear Physics News 17 (2007) 19** – in collaboration with J. Tuli (NNDC) & A. Nichols (IAEA) – **action item from the NSDD meeting**
- ✓ several invited presentations at NP/ND meetings, including: **NS2008 (C.J. Chiara)**, **DDEP meeting**, **NPAE-2008**, **FRIB Summer School (C.J. Chiara)**, **CGS13**, **PHYSOR'08** (talk given by A. Nichols, IAEA), **6<sup>th</sup> Balkan Nuclear Physics School**

# IAEA-CRP Measurements Activities

- Decay Spectroscopy of **Actinide Nuclei** – part of the ANL commitment to **IAEA-CRP** on “*Updated Decay Data Library for Actinides*” – details reported at WG meeting
  - ✓ decay studies of  $^{233}\text{Pa}$ ,  $^{237}\text{Np}$ ,  $^{240}\text{Pu}$ ,  $^{242\text{m}}\text{Am}$ ,  $^{243,244,245,246}\text{Cm}$  &  $^{249,250}\text{Cf}$  using (unique) mass separated sources using  $\alpha$ -decay and  $\gamma$ -ray spectroscopy techniques
  - ✓ work focused on priority nuclides where large data discrepancies exist:  $^{233}\text{Pa}$ ,  $^{243}\text{Cm}$  &  $^{237}\text{Np}$  - detailed report at the **WG meeting**



past discrepancies observed between data collected using magnetic spectrograph and semiconductor detectors can most likely be attributed to differences in the data analysis procedures, rather than to the inherent applicability and nature of the two methods

# Nuclear Data Research Activities

## □ Properties of K-Isomers in the A~180 and 250 mass regions (in collaboration with ANL-PHY,UML, ANU and others)

✓ complement the ANL evaluation activities on the subject - completed studies of  $^{174}\text{Lu}$  – Phys. Rev. C (submitted)

✓ new results on  $^{246,248}\text{Pu}$ ,  $^{250,252}\text{No}$ , and  $^{256}\text{Rf}$  – emphasis on actinide and SH nuclei – mqp calculations using deformed WS potential, including pairing & spin-spin residual interactions

## □ Development of Argonne Total Absorption Gamma-ray Spectrometer - ANL LDRD/DCG funding – C.J. Chiara, F.G. Kondev (NE) & K. Lister (PHY)

✓ emphasis on Nuclear Data needs for neutron-rich FP of relevance to Advanced Fuel Cycle, Homeland Security & Nuclear Astrophysics applications – will utilize the state-of-the-art CARIBU RIB facility at ANL

✓ a staff member (M. Smith) from ANSTO/ANU, Australia (fully sponsored by ANSTO/ANU) is working with us – GEANT simulations & data analysis tools

## □ 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 ( $T_{1/2}\sim 10^5\text{y}$ ) using the  $^{186}\text{W}(d,2n)$  data; (n,2n) cross section measurements campaign at the TUNL facility – led by the TUNL Nuclear Data group