A=227 Work-Plan (March 24-28, 2014)

PRACTICAL WORK

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IAEA-ICTP NSDD WORKSHOP, TRIESTE March 24-28, 2014

# A=227: Work-plan

### Why A=227?

#### Practical reasons:

- -Current data in ENSDF ~13 years old: May 1, 2001.
- -Short mass chain i.e. not a huge amount of experimental data.
- -Mixture of different types of decays and reactions.
- -Although, there are not many new papers for A=227, still each mass chain in ENSDF needs to be updated every 10 years or so

1. Update of new Q values from 2012-AME from previous 2003 values

2. Update of internal conversion coefficients using Brlcc code, replacing previous values from Hager-Seltzer coefficients. May need renormalizations of decay schemes.

3. Update of Hindrance Factors in  $\alpha$  decays, LOGFT values in beta decays based on new Q values and perhaps half-lives.

## A=227: Work-plan

#### Nuclear Structure Physics aspects:

- Experimentally known Nuclides of A=227 (Z=84-93, N=143-134) are away from Z=82, N=126 magic numbers, thus collective excitations are expected
- Strong evidence of stable Octupole deformation
- Reflection asymmetric structures.
- Comparisons with model calculations are possible

#### Practical applications:

DDEP has evaluations of Pa-231 ( $\alpha$  decay) and Ac-227 ( $\beta$ <sup>-</sup> decay) Pa-231, Ac-227, Th-227 are present in environment from U-235 decay. Pa-231, Ac-227: present in nuclear reactors, radiotoxicity of spent fuel. Pa-231 with half-life of 32760(110) y in ENSDF [32670(260) y in DDEP eval.)]: use in geology and paleoceanography, Radiometric dating of (oceanic) sediments [Pa-231/Th-230 ratio], formation of minerals, etc. T<sub>1/2</sub> needs better measurement!

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Experimentally known nuclides of A=227

Po-227: Z=84, N=143: only isotopic ID; half-life not measured: new At-227: Z=85, N=142: only isotopic ID; half-life not measured: new Rn-227: Z=86, N=141: only the g.s. known

Fr-227: Z=87, N=140: From β- decay

Ra-227: Z=88, N=139: From  $\beta$ - decay; (n, $\gamma$ ); (d,p); (polarized t,d)

Ac-227: Z=89, N=138: From  $\beta$ - and  $\alpha$  decays; ( $\alpha$ ,t); (<sup>3</sup>He,d), (p, $\alpha$ )

Th-227: Z=90, N=137: From  $\beta$ -,  $\alpha$ , and  $\epsilon$  decays; ( $\alpha$ ,  $3n\gamma$ )

Pa-227: Z=91, N=136: From  $\alpha$  decay; only the g.s. known U-227: Z=92, N=135: From  $\alpha$  decay; only the g.s. known Np-227: Z=93, N=134: only the g.s. known

Relevant α-decay parents: Pa-231, U-231, Np-231, Pu-231 Relevant α-decay daughters: Fr-223, Ra-223, Ac-223, Th-223, Pa-223



Group I: Odd-neutron Nuclei: Ra-227, Th-227 Group Leaders Libby McCutchan (BNL), Filip Kondev (ANL)

Group 2: Odd-proton Nuclei: Fr-227, Ac-227 Group Leaders Jagdish Tuli (BNL), Balraj Singh (McMaster)

Please sign up for one of the groups (about the same number in each group)

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- All work <u>will not</u> get completed by March 28. Quite a lot will be required in the next few weeks.
- Expected completion of first draft by May 31, 2014
- Send data files to B. Singh, co-ordinator for this evaluation.
- Final files by end of July 31, 2014; send for review to Dr. E. Browne (LBNL), evaluator of 2001 NDS for A=227
- Possible joint publication in NDS by Dec 2014 under the authorship of group leaders, and those participants who contribute effectively to the evaluation effort.

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### Reference material on CD:

A=227 data files in current ENSDF and XUNDL databases Updated files for Po-227, At-227, Rn-227, Pa-227, U-227, Np-227: Please check for completeness and accuracy; will appreciate comments All previously published NDS evaluations of A=227 A=227, 231 in Table of isotopes-1978 A=227, 231 DDEP evaluations of selected isotopes. AME-2012 data files in Chinese Physics C (Dec 2012) 2014StZZ: compilation of static magnetic dipole and electric quadrupole moments 2013An02: evaluated nuclear radii. Requires familiarity with retrievals of information from ENSDE

Requires familiarity with retrievals of information from ENSDF, XUNDL, NSR, NUDAT databases; and computer codes FMTCHK, GTOL, BrIcc, LOGFT, ALPHAD, PANDORA, ENSDAT

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Ask lots of questions about ENSDF format, policies, content, and , of course, future participation in NSDD!

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HAPPY E. N. D. !
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