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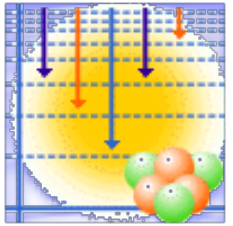


Consistency in assigning configurations in ENSDF

action item from the 2017 NSDD meeting

F.G. Kondev (ANL) & T.X. Kibedi (ANU)

General policies

GENERAL POLICIES - Presentation of Data

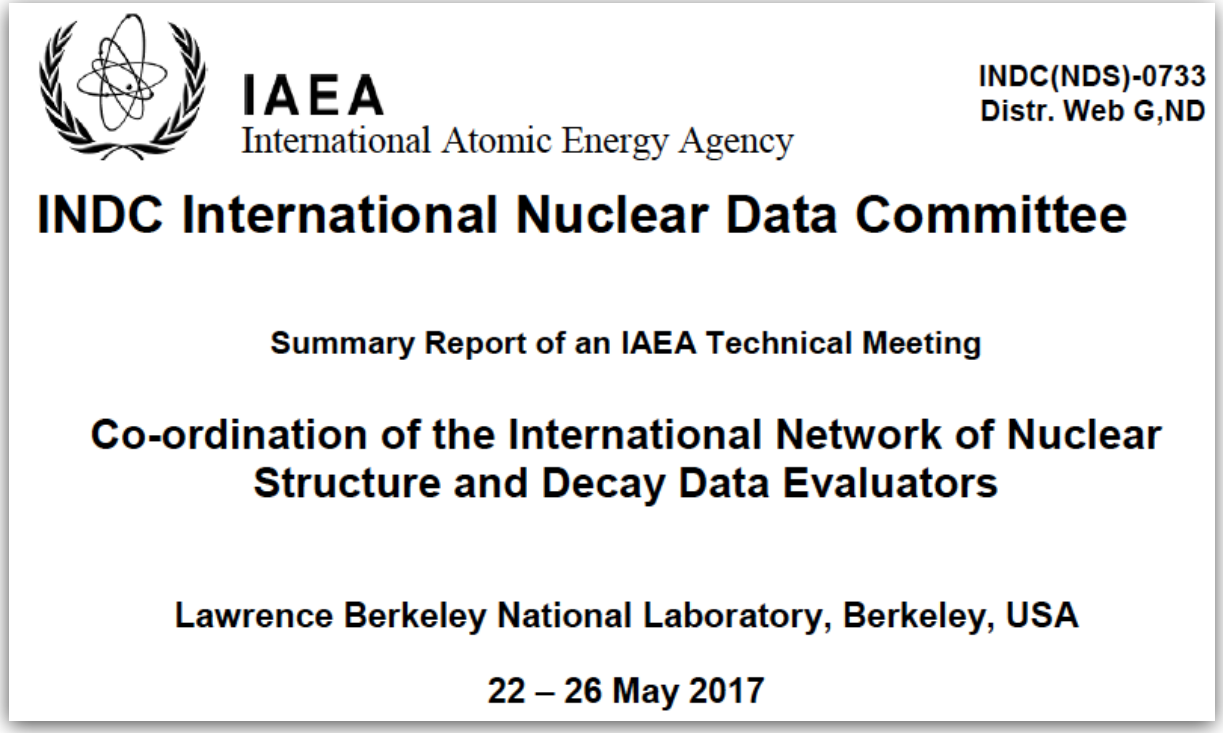
For each level:

1. **E(lev)**: Excitation energy (relative to the ground state).
2. **J^{π}**: Spin and parity with arguments supporting the assignment.
3. **$T_{1/2}$ or Γ**: Half-life or total width in center of mass.
4. **Decay branching** for the ground state and isomers (an isomer is recently redefined as a nuclear level with $T_{1/2} \geq 100$ ns (earlier it was ≥0.1 s) or one for which a separate decay data set is given in ENSDF).
5. **Q,μ**: Static electric and magnetic moments.
6. **XREF Flags** to indicate in which reaction and/or decay data sets the level is seen.
7. **Configuration assignments** (*e.g.*, Nilsson orbitals in deformed nuclei, shell-model assignments in spherical nuclei).
8. **Band assignments** and possibly band parameters (*e.g.*, rotational bands in deformed regions).
9. Isomer and isotope shifts (usually only a literature reference is given).
10. Charge distribution of ground states (usually only a literature reference is given).
11. Deformation parameters.
12. **B(E2)↑,B(M1)↑,..**: Electric or magnetic excitation probabilities when the level half-life or the ground-state branching is not known.

- inconsistencies
- missing assignments

- we must provide CONF at least for the ground state and isomers when Jπ are known
- useful when using systemics arguments for Jπ assignment
- vital in nuclear structure studies & applications (e.g. beta/antineutrino-spectra)

Recommendations from the last NSDD meeting



IAEA
International Atomic Energy Agency

INDC(NDS)-0733
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INDC International Nuclear Data Committee

Summary Report of an IAEA Technical Meeting

Co-ordination of the International Network of Nuclear Structure and Decay Data Evaluators

Lawrence Berkeley National Laboratory, Berkeley, USA

22 – 26 May 2017

40	ANL, ANU	Policy implementation	Recommend suitable standard(s) for band configurations - need to agree upon the adoption of a particular nomenclature.

Spherical nuclei: shell-model notation

- ✓ use only the valence particles (holes)
- ✓ the spin & parity balance - caution with ranges …
- ✓ close relation between CONF and MOMM1 (g-factors, g_K-g_R …)

single-particle (hole)

$\pi(h_{9/2}^{+1})$ |p(h{-h/2}{++1}), e.g. $^{209}Bi_{83}$; Jπ=9/2-

$\nu(p_{1/2}^{-1})$ |n(p{-1/2}{+-1}), e.g. $^{207}Pb_{125}$; Jπ=1/2-

$\pi(h_{9/2}^{+1}) \otimes 2^+$ |p(h{-h/2}{++1})~#2{++}; Jπ=5/2- to 13/2-

two-particle (hole)

$\pi(h_{9/2}^{+1}) \otimes \nu(p_{1/2}^{-1})$ |p(h{-h/2}{++1})~#|n(p{-1/2}{+-1}); Jπ=4+ or 5+

$\pi(h_{9/2}^{+2})_{8^+}$ |p(h{-h/2}{++1}){-{8{++}}}; Jπ=8+

many-particle (hole)

$\pi(h_{9/2}^{+1}) \otimes \nu(p_{1/2}^{-1}, f_{5/2}^{-1})_{4^+}$ Jπ=1/2- το **17/2-**, odd-Z (N)

$\pi(h_{9/2}^{+2})_{8+} \otimes \nu(p_{1/2}^{-1}, f_{5/2}^{-1})_{4^+}$ Jπ=12+, even-even (or odd-odd)

Deformed nuclei: Nilsson-level labeling

one-quasiparticle states

$$K^\pi = 1/2^-, \pi 1/2^-[541]$$
$$K^\pi = 7/2^+, \nu 7/2^+[633]$$

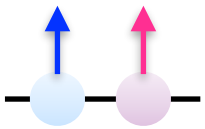
two-quasiparticle states

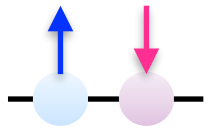
$$K^\pi = 2^-, \pi 1/2^-[541] \otimes \nu 7/2^+[633]$$
$$K^\pi = 8^-, \pi^2(7/2^+[404], 9/2^-[514])$$

Note the Gallagher-Moszkowski rule

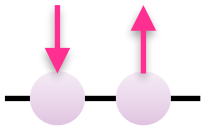
$K_h = K_1 + K_2$ I=K $K_l = |K_1 - K_2|$

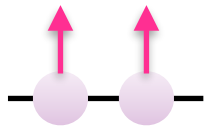
odd-odd





even-even

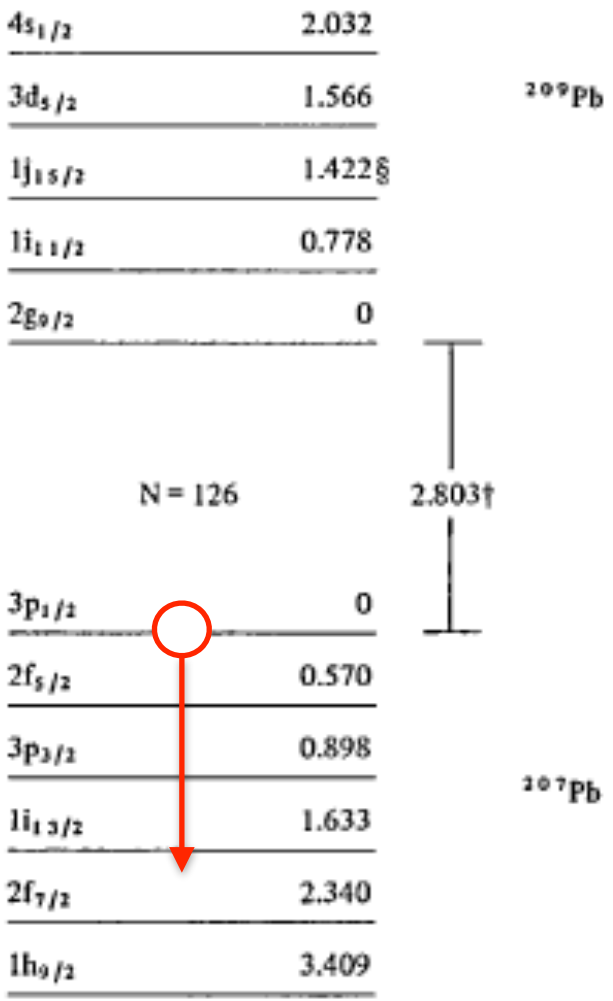


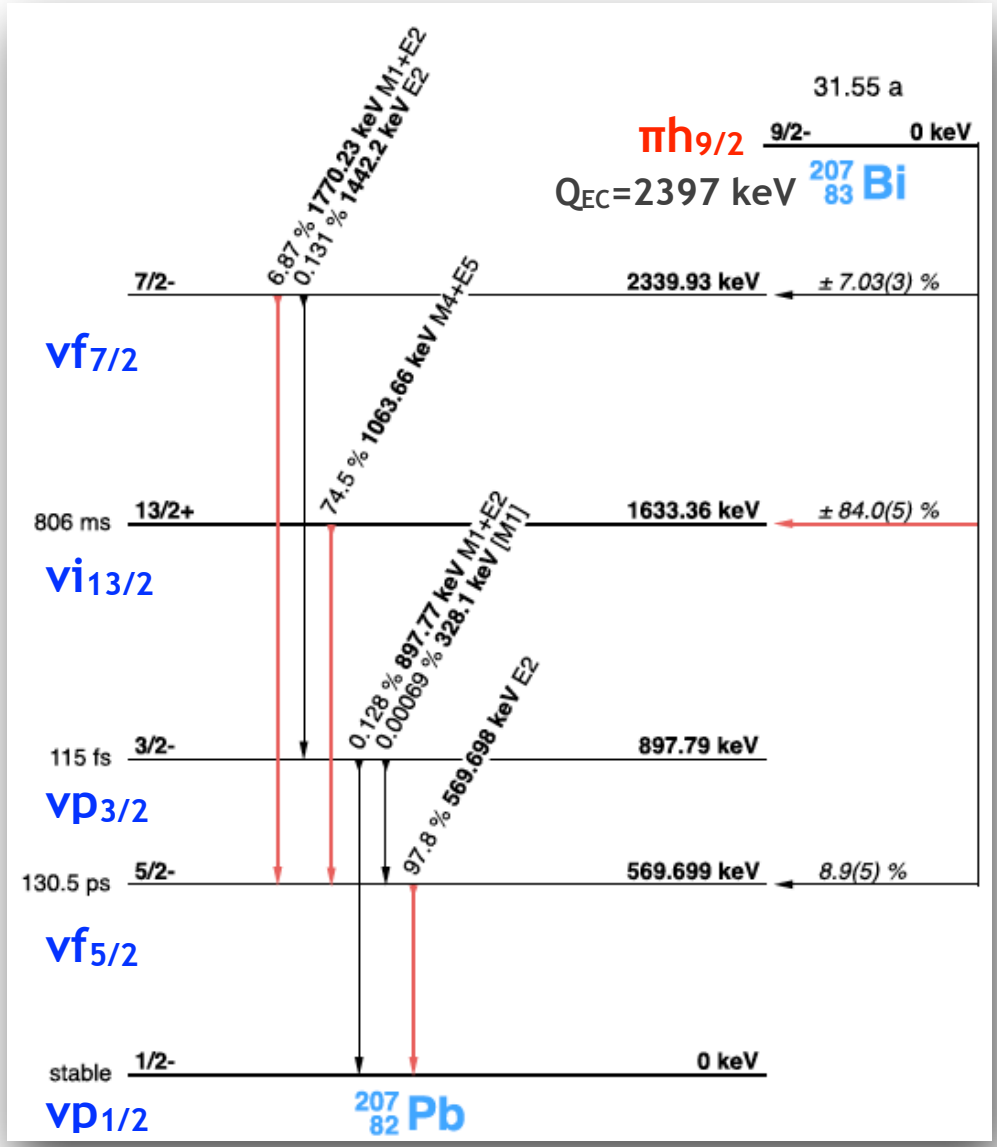


multi-quasiparticle states

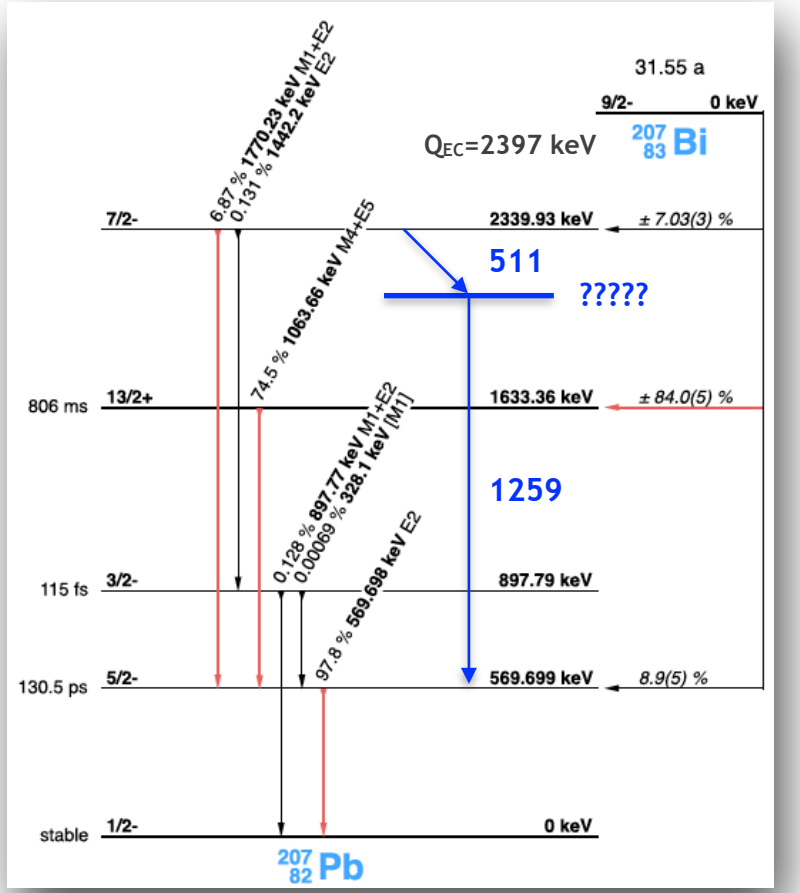
$$K^\pi = 14^+, \pi^2(7/2^+[404], 9/2^-[514])_{8^-} \otimes \nu^2(5/2^-[512], 7/2^+[633])_{6^-}$$

some time complicated band structures (very high spin) -> shell-model notation

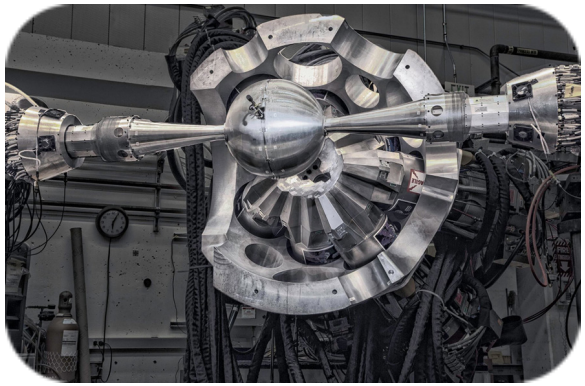


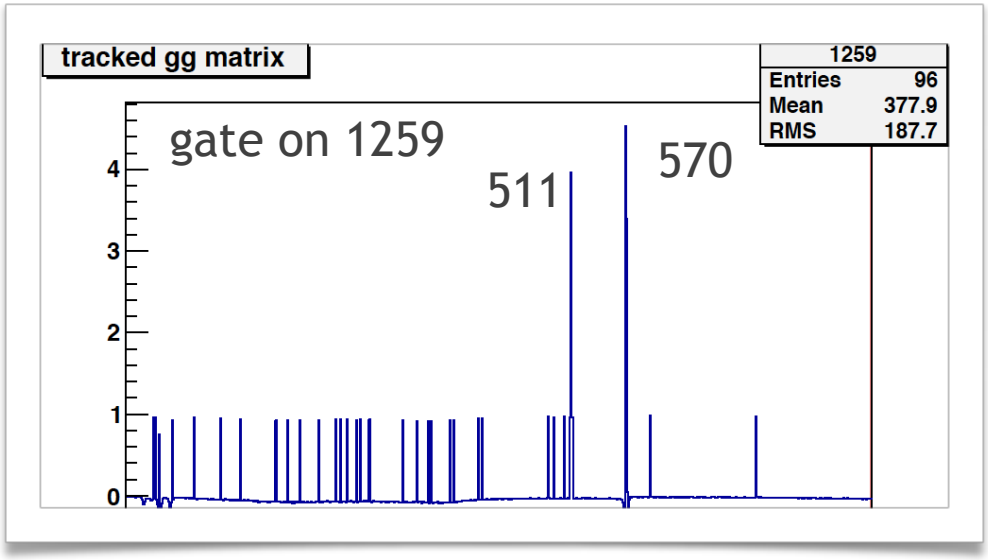


- **1259**-keV gamma shows the 32y half-life - related to 207Bi decay?



GRETINA @ ANL





$\nu(j_{x/2}^{-1}) \otimes 2^+$ will be > 2.8 MeV and above Qε

- **1259-keV** gamma-ray is the first escape of **1770-keV** gamma ray