



# Inclusion of Absolute $\gamma$ -ray Emission Probabilities in ENSDF Decay Data

Proposal from

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- ❑  $\%IG = NR \cdot BR \cdot RI$ , but there are issues when  $\gamma$ 's feeding the ground state were used in the normalization procedure - the  $\%IG$  uncertainties for these  $\gamma$ 's are overestimated in LiveChart & NUDAT, as well as by DDEP ...
- ❑ a proposal was presented at the 21<sup>st</sup> NSDD meeting to include  $\%IG$  in ENSDF and solve those deficiencies
- ❑ many positive responses, but inability to modify the *gabs* program hampered implementation - IAEA stepped in to help (the ENSDF code project - V. Dimitriou)
- ❑ recent development: T. Kibedi (ANU) is upgrading *gabs* to deal with all cases - currently undergoes enhanced development & testing & will be presented at the upcoming code meeting by IAEA

# gabs -F

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177LU 177YB B- DECAY 1995Ya21 03NDS 200305
177LU H TYP=FUL$AUT=F.G. KONDEV$CIT=NDS 98, 801 (2003)$CUT=1-Aug-2002$
177LU CL E$From least-squares fit to E|g
177LU CL J,T$From adopted levels. Additional details are given with some
177LU2CL levels.
177LU CL E(A)$ K|p=7/2+, |p7/2[404]
177LU CL E(B)$ K|p=9/2-, |p9/2[514]
177LU CL E(C)$ K|p=5/2+, |p5/2[402]
177LU CL E(E)$ K|p=9/2-, |p(7/2[404])~#|n{+2}(7/2[514],9/2[624])
177LU CL E(G)$ K|p=11/2+, |p(9/2[514])~#|n{+2}(7/2[514],9/2[624])
177LU CL E(H)$ K|p=7/2+, |p(9/2[514])~#|n{+2}(7/2[514],9/2[624])
177LU CG E,RI$ From 1995Ya21, unless otherwise stated.
177LU cG E(a),M,MR$From adopted gammas.
177YB P 0.0 9/2+ 1.911 H 3 1397.4 12
177LU N 1.0 0.406 50
177LU PN 3
177LU L 0.0 7/2+ 6.647 D 4 A
177LU B 1400 20 54 5 6.50 4
177LUS B EAV=496.64 83
177LU L 121.6214 49/2+ 0.117 NS 4 A
177LU B 8.6 11 7.15 6
177LUS B EAV=446.52 82
177LU G 121.6211 5 60 3 M1+E2 +0.51 5 2.00 4 a Y
177LU L 150.3986 109/2- 130 NS 3 B
177LU B 21 3 6.73 7
177LUS B EAV=434.80 82
177LU G 150.399 1 354 19E1 0.512 32 a Y
177LU L 268.7850 511/2+
177LU B 0.53 10 8.17 9 A
177LUS B EAV=386.83 81
177LU G 147.1637 5 3.2 6 M1+E2 +0.59 7 1.114 25 a
177LUS G KC=0.86 4$LC=0.198 8$MC=0.0463 21
177LUS G NC=0.0108 5$OC=0.00149 5$PC=6.2E-5 3
177LU cG E$147.3 {I1} (1995Ya21)
177LU cG RI$Weighted average of 3.1 {I7} (1995Ya21) and 3.3 {I10} (1970Br38)
177LU CG M$Others: EKC=1.22 54 (1972Ag05); |d(|g|g(|q))=0.58 {I+13-15}
177LU2cG (1995Ya21)
177LU G 268.7847 6 3.1 2 E2 0.1071 a Y

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- ❑ will use proper uncertainty propagation (e.g. E. Browne NIM A249 (1986) 461) when  $\gamma$ 's feeding the ground state are used in the normalization procedure
- ✓ Y (or X) in column 79
- ✓ take into account the direct feeding to the ground state in B or E records
- ✓ will calculate NR and put %IG in the continuation record

$$NR = \frac{(100 - I_{\beta 0})}{\sum I_{\gamma i} \times (1 + \alpha_{Ti})}$$

# gabs -M

```
177LU 177YB B- DECAV 1995Ya21 03NDS 200305
177LU H TYP=FUL$AUT=F.G. KONDEV$CIT=NDS 98, 801 (2003)$CUT=1-Aug-2002$
177LU CL E$From least-squares fit to E|g
177LU CL J,T$From adopted levels. Additional details are given with some
177LU2CL levels.
177LU CL E(A)$ K|p=7/2+, |p7/2[404]
177LU CL E(B)$ K|p=9/2-, |p9/2[514]
177LU CL E(C)$ K|p=5/2+, |p5/2[402]
177LU CL E(E)$ K|p=9/2-, |p(7/2[404])~#|n{+2}(7/2[514],9/2[624])
177LU CL E(G)$ K|p=11/2+, |p(9/2[514])~#|n{+2}(7/2[514],9/2[624])
177LU CL E(H)$ K|p=7/2+, |p(9/2[514])~#|n{+2}(7/2[514],9/2[624])
177LU CG E,RI$ From 1995Ya21, unless otherwise stated.
177LU cG E(a),M,MR$From adopted gammas.
177YB P 0.0 9/2+ 1.911 H 3 1397.4 12
177LU N 1.0 0.406 50
177LU PN 3
177LU L 0.0 7/2+ 6.647 D 4 A
177LU B 1400 20 54 5 6.50 4
177LUS B EAV=496.64 83
177LU L 121.6214 49/2+ 0.117 NS 4 A
177LU B 8.6 11 7.15 6
177LUS B EAV=446.52 82
177LU G 121.6211 5 60 3 M1+E2 +0.51 5 2.00 4 a Y
177LU L 150.3986 109/2- 130 NS 3 B
177LU B 21 3 6.73 7
177LUS B EAV=434.80 82
177LU G 150.399 1 354 19E1 0.512 32 a Y
177LU L 268.7850 511/2+ A
177LU B 0.53 10 8.17 9
177LUS B EAV=386.83 81
177LU G 147.1637 5 3.2 6 M1+E2 +0.59 7 1.114 25 a
177LUS G KC=0.86 4$LC=0.198 8$MC=0.0463 21
177LUS G NC=0.0108 5$OC=0.00149 5$PC=6.2E-5 3
177LU cG E$147.3 {I1} (1995Ya21)
177LU cG RI$Weighted average of 3.1 {I7} (1995Ya21) and 3.3 {I10} (1970Br38)
177LU CG M$Others: EKC=1.22 54 (1972Ag05); |d(|g|g(|q))=0.58 {I+13-15}
177LU2cG (1995Ya21)
177LU G 268.7847 6 3.1 2 E2 0.1071 a Y
```

from an ENSDF-formated decay data file will automatically create a new ENSDF file with the g's feeding the ground state marked with Y (or X) in column 79

# gabs -C

```
177LU 177YB B- DECAV 1995Ya21 03NDS 200305
177LU H TYP=FUL$AUT=F.G. KONDEV$CIT=NDS 98, 801 (2003)$CUT=1-Aug-2002$
177LU CL E$From least-squares fit to E|g
177LU CL J,T$From adopted levels. Additional details are given with some
177LU2CL levels.
177LU CL E(A)$ K|p=7/2+, |p7/2[404]
177LU CL E(B)$ K|p=9/2-, |p9/2[514]
177LU CL E(C)$ K|p=5/2+, |p5/2[402]
177LU CL E(E)$ K|p=9/2-, |p(7/2[404])~#|n{+2}(7/2[514],9/2[624])
177LU CL E(G)$ K|p=11/2+, |p(9/2[514])~#|n{+2}(7/2[514],9/2[624])
177LU CL E(H)$ K|p=7/2+, |p(9/2[514])~#|n{+2}(7/2[514],9/2[624])
177LU CG E,RI$ From 1995Ya21, unless otherwise stated.
177LU cG E(a),M,MR$From adopted gammas.
177LU DG CC$FROM BrIcc v2.3b (16-Dec-2014) 2008Ki07, "Frozen Orbitals" appr.
177YB P 0.0 9/2+ 1.911 H 3 1397.4 12
177LU N 0.051 7 1.0 1.0
177LU PN 3
177LU L 0.0 7/2+ 6.6443 D 9 A
177LU B 59 6 6.46 5
177LUS B EAV=495.89 50
177LU L 121.6214 49/2+ 0.117 NS 4 A
177LU B 7.5 12 7.21 7
177LUS B EAV=445.76 50
177LU G 121.6211 5 60 3 M1+E2 +0.51 5 2.00 4 a
177LU2 G %IG=3.0 5
177LU L 150.3986 109/2- 130.0 NS 24 BM1
177LU B 19 3 6.77 7
177LUS B EAV=434.01 49
177LU G 150.399 1 354 19E1 0.512 32 a
177LU2 G %IG=18.0 23
```

- ❑ will use %IG=NR x BR x RI
- ✓ will calculate and place %IG in the continuation record

- ❑ the new **gabs** program will be rigorously tested at the upcoming code meeting at IAEA and afterwards ...
- ❑ formal proposal will be presented for approval at the upcoming NSDD meeting
- ❑ there should be no issue to implement it after the NSDD meeting

please provide any comments & suggestions to Tibor  
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