ENSDF MODEL EXAMPLES

Coral M. Baglin
Lawrence Berkeley National Laboratory

Lecture I. Reaction Datasets

Lecture II. Adopted Levels, Gammas Datasets

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Lecture I. Reaction Dataset Examples:

^{186}Os: from ^{176}Yb(^{14}C,4nγ)
^{186}W: from Coulomb Excitation
^{59}Fe: from ^{58}Fe(d,p), (pol d,p)
^{59}Fe: from ^{58}Fe(d,pγ)
^{59}Fe: from ^{59}Co(n,p)
^{170}Tm: from ^{169}Tm(n,γ) E=thermal
^{170}Tm: from ^{169}Tm(n,γ) E=thermal: two-photon cascades
^{170}Tm: from ^{169}Tm(n,γ) E=2, 24 keV
^{170}Tm: from ^{169}Tm(d,p)
^{170}Tm: from ^{170}Er(^{3}He,t)
^{170}Tm: from ^{170}Tm(d,d')
^{170}Tm: from ^{171}Yb(t,α)
^{170}Er: from ^{170}Er(γ,γ'), (γ, pol γ') (resonance fluorescence)
^{59}Co: from ^{58}Fe(p,p')

$^{176}Yb(^{14}C,4n\gamma)$

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186OS    176YB(14C,4NG)                    1999WH02,1999WH01
186OS  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 99, 1 (2003)$CUT=4-Apr-2003$
186OS C  1999WH02: E=67 MEV; 95.7% 176YB TARGET; ^NORDBALL DETECTOR ARRAY (18
186OS2C  COMPTON-SUPPRESSED COAXIAL Ge DETECTORS, 2 PLANAR COMPTON-SUPPRESSED
186OS3C  Ge DETECTORS, 50-ELEMENT BALL OF BaF{-2} DETECTORS FOR G-MULTIPLICITY
186OS4C  DETERMINATION, 30-ELEMENT Si-detector INNER BALL FOR CHARGED-PARTICLE
186OS5C  EVAPORATION CHANNEL IDENTIFICATION).  MEASURED EG, IG, GG COIN (550 NS
186OS6C  TIME WINDOW), G-X COIN, G-G-t, G(T), ^DCO RATIOS (79 DEG OR 101 DEG,
186OS7C  37 DEG OR 143 DEG).  BAND MIXING ANALYSIS AND BLOCKED ^BCS AND
186OS8C  CONFIGURATION-CONSTRAINED POTENTIAL-ENERGY-SURFACE CALCULATIONS.
186OS9C  SEE ALSO 1999WH01.
186OS C  THEORY: FOR CALCULATION OF HINDRANCE FOR high-^K ISOMER DECAY, SEE
186OS2C  2002SH41.
186OS CG E          FROM 1999WH02; UNCERTAINTY UNSTATED BY AUTHORS.
186OS CG M          FROM MEASURED ^DCO RATIOS (79 DEG (OR 101 DEG), 37 DEG (OR
186OS2CG 143 DEG)).  THE VALUES GIVEN IN COMMENTS ARE FOR STRETCHED Q GATING
186OS3CG TRANSITIONS, UNLESS NOTED OTHERWISE, AND EXPECTED VALUES ARE AP 0.56
186OS4CG FOR STRETCHED ^D TRANSITIONS AND AP 1.00 FOR STRETCHED Q (OR ^D, DJ=0)
186OS5CG TRANSITIONS (1999WH02).  DPI=NO IS ASSUMED FOR IN-BAND Q TRANSITIONS.
186OS CG E(W)       EG IS SHOWN IN PARENTHESES IN TABLE 1 OF 1999WH02;
186OS2CG EVALUATOR INTERPRETS THIS AS AN INDICATION THAT THE PLACEMENT IS
186OS3CG UNCERTAIN.  HOWEVER, TRANSITION IS NOT SHOWN AS UNCERTAIN IN FIG. 1.
186OS CG M(Z)       ^DCO RATIO IS HIGHER THAN EXPECTED FOR A PURE ^D TRANSITION.
186OS2CG 1999WH02 SUGGEST THAT THIS MAY BE A RESULT OF NUCLEAR DEORIENTATION,
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186OS3CG SINCE MOST OF THE INTENSITY FEEDING THE 5- PARENT LEVEL IS DELAYED
186OS4CG BY THE 7- AND 9- ISOMERS.
186OS CL E          FROM LEAST-SQUARES ADJUSTMENT OF EG, ALLOWING 1 KEV
186OS2CL UNCERTAINTY IN EG (1999WH02 DO NOT STATE UNCERTAINTY).
186OS CL J          AUTHORS' VALUES, BASED ON TRANSITION MULTIPOLARITY DEDUCED
186OS2CL FROM MEASURED ^DCO RATIOS AND BAND STRUCTURE.
186OS CL T          FROM |g-t (TIME CENTROID SHIFTS) OR |g-|g-t (PROJECTED TIME
186OS2CL SPECTRA FITTED WITH PROMPT GAUSSIAN CONVOLUTED WITH AN EXPONENTIAL
186OS3CL DECAY) (1999WH02).
186OS CL J(X)       PROBABLY A FOUR-QUASINEUTRON INTRINSIC TRIAXIAL (|q=23 DEG)
186OS2CL STATE; BLOCKED ^BCS CALCULATIONS PREDICT A LOW-LYING 18+ STATE WITH
186OS3CL CONFIGURATION=((11/2[615])+(9/2[624])+(9/2[505])+(7/2[503])).  THE
186OS4CL SHORT T, DESPITE PREDOMINANTLY DK=8 DEEXCITATION, FOR THIS YRAST STATE
186OS5CL IS CONSISTENT WITH THE ONSET OF TRIAXIALITY.
186OS CL J(Y)       PROBABLY A SIX-QUASIPARTICLE INTRINSIC TRIAXIAL (|g=26 DEG)
186OS2CL STATE; BLOCKED ^BCS CALCULATIONS PREDICT A LOW-LYING 28+ STATE WITH
186OS3CL CONFIGURATION=((18+ 4495 LEVEL)~#((|p 11/2[505])+(|p 9/2[514]))).  THE
186OS4CL SHORT ^T{-1/2} FOR THIS YRAST STATE MAY RESULT FROM THE ONSET OF
186OS5CL TRIAXIALITY.
186OS CL BAND(A)    KPI=0+ GS BAND.
186OS2CL YRAST FOR J LE 12.
186OS CL BAND(H)    KPI=10+, |a=0 tilted-axis BAND.
186OS2CL LIKELY CONFIGURATION=((|n 11/2[615])+(|n 9/2[624)), CONSISTENT WITH
186OS3CL THE RELATIVELY LARGE ALIGNMENT AND THE INTRABAND E2-TO-M1
186OS4CL BRANCHING RATIOS OBSERVED. CROSSES GS BAND; yrast for J=14-16.
186OS CL BAND(h)    KPI=10+, |a=1 tilted-axis BAND.
186OS2CL SIGNATURE PARTNER OF KPI=10+, |a=0 BAND, EXHIBITING PRONOUNCED
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186OS3CL SIGNATURE SPLITTING.
186OS CL BAND(B)   KPI=2+ GAMMA BAND.
186OS CL BAND(C)   KPI=0+ BETA BAND.
186OS2CL THE 0+ BANDHEAD (KNOWN TO LIE AT AP 1061 KEV) WAS NOT OBSERVED BY
186OS3CL 1999WH02.
186OS CL BAND(D)   POSSIBLE KPI=4+ HEXADECAPOLE BAND.
186OS2CL COULD ALTERNATIVELY BE INTERPRETED AS A TWO |g PHONON EXCITATION.
186OS CL BAND(E)   KPI=5- BAND.
186OS2CL SIMILARITY OF ALIGNMENT CURVE TO THAT FOR THE 11/2+ BAND IN 185OS
186OS3CL FAVORS CONFIGURATION=((|n 11/2[615])-(|n 1/2[510])), ANALOGOUS TO
186OS4CL THE 8.3 US, 5- ISOMER WITH THIS CONFIGURATION IN 184W.
186OS CL BAND(F)   KPI=7- BAND.
186OS2CL LIKELY CONFIGURATION=((|n 11/2[615])+(|n 3/2[512)); ALIGNMENT IS
186OS3CL CONSISTENT WITH THAT FOR OTHER (|n i{-13/2}) BANDS. ANALOGOUS TO
186OS4CL BAND WITH SAME CONFIGURATION BUILT ON 7-, 2.4 NS ISOMER IN 184W
186OS5CL ISOTONE.
186OS CL BAND(G)   KPI=9- BAND.
186OS2CL LIKELY CONFIGURATION=((|n 11/2[615])+(|n 7/2[503]), SUPPORTED BY
186OS3CL SIMILARITY OF ALIGNMENT CURVE TO THAT FOR OTHER (|n 11/2[615])
186OS4CL BANDS.
186OS CL BAND(I)   KPI=(12+) four-quasineutron band.
186OS2CL POSSIBLE
186OS3CL CONFIGURATION=((11/2[615])+(9/2[624])+(3/2[512])+(1/2[510])) BASED
186OS4CL ON COMPARISONS WITH ^BCS CALCULATIONS.
186OS CL BAND(J)   KPI=(15+) four-quasineutron band.
186OS2CL POSSIBLE
186OS3CL CONFIGURATION=((11/2[615])+(9/2[624])+(7/2[503])+(3/2[512])).
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186OS CL BAND(K)    PI=+, |a=0 BAND.
186OS2CL POSSIBLE ROTATIONAL ALIGNED low-^K s-band; ALIGNMENT MUCH LARGER THAN
186OS3CL THAT OF GS BAND.
186OS CL BAND(L)    KPI=(18-) FOUR-QUASIPARTICLE BAND.
186OS2CL POSSIBLE
186OS3CL CONF=((|n 11/2[615])+(|n 9/2[624])+(|p 5/2[402])+(|p 11/2[505])) BASED
186OS4CL ON COMPARISONS WITH BLOCKED ^BCS CALCULATIONS.
186OS CL BAND(M)    KPI=(19-) FOUR-QUASIPARTICLE BAND.
186OS2CL POSSIBLE
186OS3CL CONF=((|n 11/2[615])+(|n 7/2[503])+(|p 9/2[514])+(|p 11/2[505])) BASED
186OS4CL ON COMPARISONS WITH BLOCKED ^BCS CALCULATIONS.
186OS PN                                                                  5
186OS  L 0.0          0+                                                  A
186OS  L 137.0      8 2+                                                  A
186OS  G  137.3       799    26 E2
186OS CG M          ^DCO=1.00 1.
186OS  L 433.6      9 4+                                                  A
186OS  G  296.9       1000   30 E2
186OS CG M          ^DCO=0.98 1.
186OS  L 768.1      8 2+                                                  B
186OS  G  630.6       125     4
186OS CG M          ^DCO=0.86 2.
186OS  G  767.8       140     5 Q
186OS CG M          ^DCO=1.03 3.
186OS  L 868.4     10 6+                                                  A
186OS  G  434.9       822    25 E2
186OS CG M          ^DCO=1.02 1.
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Out-of-band γ

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186OS  L 910.1      9 3+                                                  B
186OS  G  140.0       4.27   20
186OS CG E          LOW COMPARED WITH ADOPTED EG=143.17 5.
186OS  G  476.4       9.8     5
186OS  G  773.6       131     4
186OS CG M          ^DCO=0.94 3.
186OS  L 1070.4     9 4+                                                  B
186OS  G  158.8       4.70   23
186OS CG E          LOW COMPARED WITH ADOPTED EG=160.11 10.
186OS  G  302.5       5.8     3 E2
186OS CG M          ^DCO=1.14 16.
186OS  G  636.8       98.6    3
186OS CG M          ^DCO=0.92 2; ASSIGNED AS DJ=0 (1999WH02).
186OS  G  933.7       63.6   21 Q
186OS CG M          ^DCO=1.07 8.
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^{186}W: from Coulomb Excitation

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186W      COULOMB EXCITATION                1989KU04,1977MC11,1971MI08
186W   H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 99, 1 (2003)$CUT=4-Apr-2003$
186W  C  Others: 1958Mc02, 1959Bi10 (EP=2.8 MEV), 1961Ha21 ((p,p') and (d,d')),
186W 2C  1962Bi05 (EA=3 MEV), 1967As03 (16O,16O'G), 1967Gi02 (16O,16O'G),
186W 3C  1967Ku07 (P,P'G), 1968St13 (EA=8 MEV), 1969Ch23 (EA=8 MEV), 1970Me09
186W 4C  (EA=6 MEV), 1971Ob02 (EA=6 MEV), 1972Hi14 (EP=3 MEV), 1974Ba81
186W 5C  (EA=11.5-13.5 MEV), 1974Br31 (EA=10-20 MEV), 1974Le16 (EA=12.5-19
186W 6C  MEV), 1975Le22 (EA=13.25-19 MEV), 1979Hu01, 1985St07 (E(63CU)=220 MEV),
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186W 7C  1986Bi13 (E(32S)=100 MEV), 2000WHZZ(E(238U)=1600 MEV.
186W  C  For determinations of transient-field strength and precession, see,
186W 2C  e.g., 1991St04, 1988St16, 1987St14.
186W  C  1971Mi08: (X,X'G); x=p, E=5.0, 5.08 MEV; x=a, E=14, 15 MEV; x=16O,
186W 2C  E=45.1, 45.5 MEV.
186W  C  1977Mc11: (X,X'G); x=|a, E=15 MEV; x=16O, E=42 MEV.
186W  C  1979Hu01: (84KR,84KR'G) E=340 MEV, 98.5% 186W target.
186W  C  1989Ku04: (208PB,208PB'G), E(208PB)=4.9 MeV/u; AP 95% 186W target;
186W 2C  measured EG, yield at 12 angles;
186W 3C  observed multiple COULOMB excitation of GS band (J LE 14),
186W 4C  |g band (J LE 12) and quasi-|b band (J=0 and 2); extracted
186W 5C  electromagnetic matrix elements for PI=+ yrast band.
186W  C  See also 1996Wu10 for extraction and
186W 2C  discussion of intrinsic E2 matrix elements between |DK=2 bands.
186W  CG E          From 1977Mc11, unless noted otherwise.
186W  CG RI         Relative photon branching from 1971Mi08, except as noted.
186W  CG M          From 1971Mi08, based on G anisotropy, except as noted.
186W  CG E(J)       1989Ku04 give EG=264.2 in table 1; evaluator presumes this is
186W 2CG typographical error for EG=274.2 (based on spectrum of fig. 1 and
186W 3CG systematics of EG for analogous transitions in 182W, 184W, 186W).
186W 4CG EG=274 in both 1979Hu01 and 1977Mc11.
186W  CG E(K)       From 1989Ku04; uncertainty not stated by authors.
186W  CG E(L)       Approximate value read by evaluator from spectrum in fig.1
186W 2CG of 1989Ku04 (DE AP 5 KEV); authors do not quote EG or E(level).
186W  CG M(M)       From 1977Mc11.
186W  CL            Band assignments shown here are from adopted levels. Note
186W 2CL that 1989Ku04 assign the 1006 level as the J=4 member of the |g
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186W 3CL band, whereas 1977Mc11 suggest that it is the J=2 member of the |b
186W 4CL band. The basis for the latter assignment is unclear; such an
186W 5CL assignment is inconsistent with adopted JPI(1006), so it is presumed
186W 6CL to be in error. The 1030 level is adopted as the J=2 member of the
186W 7CL |b band.
186W  CL E          From least-squares adjustment of EG, allowing DE=1 KEV
186W 2CL for transitions for which authors do not quote DE.
186W  CL T          Calculated by the evaluator from measured BE2 and adopted
186W 2CL branching.
186W  CL J          From direct E2 COULOMB excitation (1977Mc11), except as
186W 2CL noted.
186W  CL E(L)       Reported to have been observed by 1989Ku04; E(level) is
186W 2CL rounded-off value from adopted levels.
186W  CL J(M)       From band structure deduced by 1989Ku04, based on GG coin
186W 2CL data and energy and intensity systematics.
186W  CL J(N)       E2 G to (J-2) member of same band in multiple COULOMB
186W 2CL excitation.
186W  CL BAND(A)    GS BAND (1989Ku04).
186W  CL BAND(B)    K=2 |g BAND (1989Ku04).
186W 2CL Note that the 1006 level, adopted here as the 4+ member of this band,
186W 3CL was presumed to be the 2+ member of the |b band in 1977Mc11.
186W  CL BAND(C)    K=0 |b BAND.
186W 2CL Only weakly populated (J=0 and 2 members) in 1989Ku04. Authors do not
186W 3CL indicate E(level) or deexciting transitions for either member.
186W  CL BAND(D)    KPI=2- BAND.
186W 2CL K=2 based on Alaga rules for transitions from the 3- member to
186W 3CL the J=2 and 3 members of the |g band (1977Mc11).
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186W  PN                                                                  6
186W   L 0            0+                                                 A
186W  CL J          from adopted levels.
186W   L 122.6       7 2+                  1.05 NS 3                      A
186W B L BE2=3.42 5
186W  CL BE2        weighted average of 3.50 6 (1968St13), 3.37 8 (1974Br31) and
186W 2CL 3.35 7 (1975Le22). Others: 3.6 4 (1958Mc02), 3.57 25 (1961Ha21),
186W 3CL 3.35 11 (1974Le16), 3.4 3 (1989Ku04) from coulomb excitation, and 3.46
186W 4CL 12 from muonic atom (1970Hi03)
186W  CL            g-factor=0.308 17 FROM g-factor/g-factor(184W, 111)=1.07 5
186W 2CL (1991ST04) IF g-factor(184W, 111)= 0.289 7.  Others: 0.350 35
186W 3CL (1967Gi02), 0.35 3 (1967Ku07).
186W  CL            Q/Q(2+ 182W)=0.908 24 (1969Ch23), 0.906 18 (1971Ob02).
186W  CL T       $from BE2. Other values: 1.12 NS 7 (P,P'G) (1959Bi10); 1.01 NS 4
186W 2CL (A,A'G) (1962Bi05); 1.30 NS 21 (1967As03), 1.116 NS 21 pulsed beam
186W 3CL (1967Ku07); 1.38 NS 12 (1970Me09, MOSSBAUER); 1.39 NS 12 (1971Ob02,
186W 4CL MOSSBAUER); GE 1.15 NS 6 (1972Hi14, MOSSBAUER).
186W  CL            Static matrix element <2+ M(E2) 2+> =-2.19 +28-11 (1989Ku04).
186W   G 122.5                  E2                                        K
186W   L 396.7      12 4+                  36.4 PS 25                     A
186W B L BE2=1.63 11 (1971MI08)$BE4=0.14 +15-10$
186W  CL            Static matrix element <4+ M(E2) 4+> =-2.89 +37-14 (1989Ku04).
186W  CL BE2        for 2+(123) to 4+(397) excitation. Other: 2.7 4 (1989Ku04).
186W  CL BE4        from <0+ M(E4) 4+> =-0.37 17, weighted average of -0.27 10
186W 2CL (1974Le16) and -0.64 16 (1974Br31). Other <0+ M(E4) 4+>: -0.25 25
186W 3CL (1975Le22).
186W  CL J          E2 G to 2+; J=0 inconsistent with measured T.
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186W  CL           g-factor/g-factor(122, 2+)=1.04 7 (1985St07).
186W  CL           Other T: 38 PS 3 from nuclear deorientation for ions
186W 2CL recoiling in vacuum (1986Bi13).
186W   G 274.2                  E2                                      J
186W   L 737.2      7 2+              4.78 PS   16                       B
186W B L BE2=0.140 4
186W  CL BE2       Weighted average of 0.146 8 (1977Mc11; supersedes 0.150 8
186W 2CL from 1971Mi08) and 0.139 4 (1974Ba81).
186W  CL           g-factor/g-factor(122, 2+)=0.63 13 (1985St07).
186W   G 615            94    3  M1+E2      -11  -4+3
186W  CG MR        from 1971Mi08; A2=-0.140 15 (1971Mi08).
186W   G 737            100      E2
186W   L 810.1     16 6+                  4.0 PS 3                        A
186W B L BE2=1.70 12
186W F L FLAG=N
186W  CL           Static matrix element <6+ M(E2) 6+> =-3.25 +17-42 (1989Ku04).
186W  CL BE2       Weighted average of 1.89 29 (1971Mi08) and 1.66 13
186W 2CL (1979Hu01); for 4+(397) to 6+(810) excitation. Other: 1.21 +14-12
186W 3CL (1989Ku04).
186W  CL           g-factor/g-factor(122, 2+)=1.03 20 (1985St07).
186W   G 413.4                  E2                                      K
186W   L 861.8      9 (3)+                                              B
186W  CL J         E1 G from 3-; band structure.
186W   G 739
186W   L 884          (0+)                                              C
186W F L FLAG=L
186W  CL J         from adopted levels.
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186W   L 952.1     10   (2)-                                                D
186W  CL J         anisotropies of G to 2+ and G from 3-.
186W   G 215                    E1                                          M
186W  CG M         G(|q) corrected for contamination by 184W line (1977Mc11).
186W   L 1006.7    15   4+                                                  B
186W  CL BE2       1977Mc11 report BE2=0.0030 6 for 0+(GS) to 2+(1007)
186W 2CL excitation, based on 610G yield and the assumption that the 1007
186W 3CL level is the 2+ member of the |b band; however level is currently
186W 4CL designated as the J=4 member of the |g band.
186W  CL J         1989Ku04 observe the gammas known to deexcite this level, and
186W 2CL designate them as transitions from the 4+ member of the |g band
186W 3CL rather than from the 2+ member of the |b band (as supposed in
186W 4CL 1977Mc11). The J=4 assignment is consistent with expected strong
186W 5CL excitation of |g band levels in 1989Ku04 and with band systematics in
186W 6CL nearby ^W and Os even-^A nuclei.
186W   G 269
186W  CG E         rounded-off value from adopted gammas; |g not evident in
186W 2CG spectrum shown in 1989Ku04 (possibly masked by intense 274G), but
186W 3CG authors imply that it was observed.
186W   G 610           100
186W   G 884          5   12     LT                                          L
186W  CG RI        from |g yields in 1977Mc11 (G not observed).
186W 2CG However, |g is prominent in spectrum in 1989Ku04.
186W   L 1030          2+                                                  C
186W F L FLAG=L
186W  CL J         from adopted levels.
186W   L 1045.0     7   3-                                                  D
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186W S L BE3=0.101 8
186W  CL BE3       From 1977Mc11 (based on yields of 308G, 183G and 215G).
186W   G 93                    M1+E2      1.3   5                          M
186W  CG           |d{+2}=1.8 +150-11 (1977Mc11), from analysis of
186W 2CG 0+(E3)3-(M1+E2 93G)2-(E1 215G)2+ sequence.
186W   G 183           33.5     E1                                         M
186W  CG RI        from G yield (relative to 308G) in 1977Mc11.
186W  CG           Anisotropy=1.29 6 (1977Mc11); consistent with 0+(E3)3-(E1)3+
186W 2CG sequence.
186W   G 308           100       E1                                         M
186W  CG           Anisotropy=0.761 14 (1977Mc11); consistent with
186W 2CG 0+(E3)3-(E1)2+ sequence.
186W   G 1045                   [E3]                                        S
186W  CG M         1045 level directly populated by E3 COULOMB excitation
186W 2CG (1977Mc11).
186W   L 1196      6 (5+)                                                   B
186W F L FLAG=M
186W   G 799        5                                                       L
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^{58}Fe(d,p), (pol d,p)

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 59FE    58FE(D,P), (POL D,P)          1964SP03,1972MC18,1980TA05
 59FE  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 95,215 (2002)$CUT=8-Feb-2002$
 59FE C  Others: 1968GR18, 1967KL03, 1964BJ01.
 59FE C  1980TA05: E(POL D)=10 MEV, measured SIGMA(THETA) and analyzing
 59FE2C  power, 12 angles from 25 DEG to 80 DEG (lab), enriched targets
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59FE3C  (82.48%), 8 SI(LI)-detectors at 15 DEG intervals, FWHM=30-50 KEV for
59FE4C  15-MEV protons, |s(|q) and analyzing power compared with DWBA
59FE5C  calculations.
59FE C  1972MC18: E(D)=10 MEV and 12 MEV, measured SIGMA(THETA), THETA(c.m)
59FE2C  from AP 5 DEG to AP 90 DEG, enriched targets (85.4%), multigap
59FE3C  spectrograph, FWHM=16 KEV for 16-MEV protons.
59FE C  1968GR18: E(D)=6 MEV. DWBA analysis of SIGMA(THETA); levels at 730,
59FE2C  1020, 1230, 1910 and 3590; deduced (2JF+1)^S for each level.
59FE C  1967KL03: E(D)=10 MEV, measured SIGMA(THETA), 34 angles from 7.5 DEG to
59FE2C  165 DEG, surface-barrier detector for protons at 25 DEG to 165 DEG with
59FE3C  FWHM (GS)=44 KEV, magnetic spectrograph at 5 angles from 7.5 DEG to
59FE4C  35 DEG.
59FE C  1964SP03: E(D)=6.55 MEV, THETA=30 DEG and 45 DEG; for E(D)=7.0 MEV,
59FE2C  THETA=10 DEG. Measured EP, enriched target (75.1%), single-gap
59FE3C  spectrograph.
59FE C  1964BJ01: E(D)=3-4.3 MEV, THETA=145.5 DEG, levels at 0, 290, 477,
59FE2C  614, 639, 732 KEV, DE=8 KEV.
59FE C  Spectroscopic factors from 1967KL03 are in very poor agreement with
59FE2C  those from 1972MC18 and 1980TA05. The results of 1980TA05 and 1968GR18
59FE3C  are in fair agreement with 1972MC18.
59FE CL L,S       L values and spectroscopic factors are from 1972MC18, based
59FE2CL on comparison of 10 MEV data with DWBA calculations, except as noted.
59FE CL E         From 1964SP03, except as noted.
59FE CL J         From L value and measured analyzing power (1980TA05).
59FE CL S$LABEL=S'
59FE CL E(A),S(A) From 1972MC18. Value of ^S' shown assumes L=1.
59FE CL L(B),S(B)$From 1980TA05.
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59FE CL E(D)       Doublet.
59FE CL E(E)       From 1964BJ01.
59FE CL J(F),L(F)$Weakly excited state; |s(|q) corrected for JPI=3/2- 58FE
59FE2CL contaminant nearby. Analyzing power compatible with 3/2- or 5/2-.
59FE3CL |s(|q) poorly fitted by L=1 or L=3 DWBA in 1980TA05, and deviates
59FE4CL significantly from |s(|q) for other levels at |q>60 DEG. Consequently,
59FE5CL evaluator considers authors' L=1 assignment to be uncertain; it also
59FE6CL conflicts with adopted JPI(574)=5/2-.
59FE  L 0                    3/2-                    1         1.45
59FE  L 287        10        1/2-                    1         0.09
59FE  L 473        10        5/2-                    3         2.10
59FE  L 574                (3/2-,5/2-)               (1,3)     0.017        A
59FE3 L FLAG=F
59FE  L 614        8                                                       E  ?
59FE  L 639        8                                                       E  ?
59FE  L 728        10        3/2-                    1         0.50
59FE  L 1026       10        (7/2)-                  3         0.19
59FE  L 1081                                         1         0.010
59FE  L 1162       10                                1         0.009
59FE  L 1214       10        1/2-                    1         1.19
```

^{58}Fe(d,pγ)

Separated from (d,p) data set because γ rays observed

```
59FE    58FE(D,PG)                        1977PA18
59FE  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 95,215 (2002)$CUT=8-Feb-2002$
59FE C  E(D)=3.5 MEV. Measured EG, natural and enriched (83.5%) targets, GELI
```

```
59FE2C  (1977PA18).
59FE CL E          From EG.
59FE  L 0
59FE  L 287.3      10
59FE  G  287.3     10
59FE  L 472        3
59FE  G  472       3
59FE  L 570.9      10
59FE  G  570.9     10
59FE  L 727.1      10
59FE  G  727.1     10
59FE  L 1210.6     10
59FE  G  1210.6    10
```

^{59}Co(n,p)

```
59FE     59CO(N,P)                          1993AL21,1963MO13
59FE  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 95,215 (2002)$CUT=8-Feb-2002$
59FE C  1993AL21: EN=198 MEV, |q(lab)=0 DEG-20 DEG (4 DEG steps), 99.99% 59CO
59FE2C  targets, magnetic spectrometer, FWHM AP 900 KEV; measured energy
59FE3C  spectra at 6 angles for protons exciting levels with E<30 MEV; ^DWIA
59FE4C  analysis. Decomposed strength function into L=0,1,2,3 components;
59FE5C  ^GT resonance (L=0) observed with centroid at 4.1 MEV. See 2001LA12
59FE6C  and 1999CA29 for further discussion of these results.
59FE C  1963MO13: measured energy and angular distribution of protons emitted
59FE2C  from 59CO when bombarded by 14.8-MEV 3H(D,N) neutrons.
```

^{169}Tm(n,γ) E=thermal

```
170TM     169TM(N,G) E=0-136 EV          1996HO12,1989DU03,1968LO09
170TM  H  TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170TM C   Target JPI=1/2+.
170TM C   This dataset includes 169TM(D,PG).
170TM C   For data from (N,G) E=thermal: two-photon cascade measurements, see
170TM2C   separate data set.
170TM C   Others: 1966SH03, 1967AN04, 1967BA17, 1970BH03 [(N,G) E=res].
170TM C   1996HO12: 169TM(N,G) E=thermal; ^GAMS1 and ^GAMS2/3 curved-crystal
170TM2C   spectrometers, FWHM<5.6x10{+-6}E{-|g}{+2} for first-order diffraction;
170TM3C   ^BILL B spectrometer; Ge and X-RAY detectors for GG
170TM4C   coin measurements; natural TM oxide
170TM5C   and metal targets; measured secondary G (AP 570 transitions) EG, IG,
170TM6C   Ice, GG coin. These data supersede most data from 1994HOZZ and 1995HOZZ
170TM C   1989DU03: 169TM(N,G) E=thermal; Si(Li) detector, FWHM=0.35 KEV at
170TM2C   30 KEV.
170TM C   1968LO09: 169TM(N,G) E LE 136 EV (resonant and nonresonant);
170TM2C   measured primary EG, IG; deduced ^S(n)=6593.8 14 (cf.
170TM3C   6593.3 11 (1995AU04)).
170TM C   1967AN04: 169TM(D,PG) E=9 MeV, 169TM(N,G) E=thermal; measured
170TM2C   ^T{-1/2}, Ice, IG, GG-delayed coin; deduced conversion coefficients
170TM3C   assuming E2-theory value for ELC(115G).
170TM C   1967BA17: 169TM(N,G) E=thermal, double-focusing |b spectrometer;
170TM2C   measured E(ce), Ice.
170TM C   1966SH03: 169TM(N,G) E=thermal; measured EG, IG for primary
```

```
170TM2C  transitions and EG, IG, Ice for secondary transitions.
170TM3C  Assigned nuclear configurations.
170TM C  For neutron resonance parameters and thermal n cross section,
170TM2C  see 1984MUZY.
170TM C  The level scheme is based on 1996HO12.
170TM C  Nuclear band configurations: see 1966SH03, 1996HO12.
170TM CG           Conversion electron data are from 1994HOZZ and 1996HO12,
170TM2CG unless indicated otherwise.
170TM CL E         For E<1380: from least-squares adjustment of EG, omitting
170TM2CL multiply-placed gammas and the 960.6G which fits its placement poorly.
170TM3CL For E GE 1380: from primary transition EG and ^S(n).
170TM CL J         For E<1380: from adopted levels. For E GE 1380:
170TM2CL based on primary transition intensities to state from various 0+ and 1+
170TM3CL resonances corresponding to E(n)|<136 EV, assuming mult=E1 for observed
170TM4CL primary transitions (1968LO09). The latter assumption implies J|<2-
170TM5CL for all final states observed by 1968LO09, limits J to 1 for levels fed
170TM6CL from J=0 resonances, and suggests J|=1 for levels fed from J=1 but
170TM7CL not from J=0 resonances. Note that J=0 for the 17.5-EV resonance
170TM8CL (1970BH03); this differs from the value used in 1968LO09, and the
170TM9CL evaluator has modified those authors' JPI conclusions accordingly.
170TM CL BAND(A)   KPI=0- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 1/2[521])
170TM CL BAND(B)   KPI=1- GS BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 1/2[521])
170TM CL BAND(C)   KPI=1- BAND.
170TM2CL Configuration=(|p 3/2[411])-(|n 1/2[521]) plus (|p 7/2[404])-(|n
170TM3CL 5/2[512]).
```

```
170TM CL BAND(D)   K|p=3- band.
170TM2CL Configuration=(|p 1/2[541])-(|n 7/2[633]).
170TM CL BAND(E)   KPI=2- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 5/2[512]).
170TM CL BAND(H)   KPI=0+ BAND.
170TM2CL Configuration=(|p 7/2[404])-(|n 7/2[633]).
170TM CL BAND(J)   KPI=3- BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 5/2[512]).
170TM CL BAND(O)   KPI=1- BAND.
170TM2CL Configuration=(|p 3/2[411])-(|n 5/2[512]) plus (|p 1/2[411])+(|n
170TM3CL 1/2[510]) plus ((|p 1/2[411])-(|n 5/2[512])-|g vibration).
170TM CL BAND(Q)   KPI=1+ BAND.
170TM2CL Configuration=(|p 1/2[541])+(|n 1/2[521]).
170TM CL BAND(S)   KPI=0+ BAND.
170TM2CL Configuration=(|p 1/2[541])-(|n 1/2[521]).
170TM CL BAND(T)   KPI=1- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 3/2[521]) plus (|p 7/2[404])-(|n
170TM3CL 5/2[512]) plus (|p 3/2[411])-(|n 1/2[521]).
170TM CL BAND(U)   KPI=2- BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 3/2[521]) plus (|p 3/2[411])+(|n
170TM3CL 1/2[521]) plus ((|p 1/2[411])+(|n 1/2[521])-|g vibration).
170TM CL BAND(V)   KPI=0- BAND.
170TM2CL Configuration=(|p 7/2[523])-(|n 7/2[633]).
170TM DL BAND(W)   KPI=(1)- BAND.
170TM2DL BUILT ON KPI=1- GS BAND.
170TM CL BAND(Z)   KPI=3+ BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 7/2[633]).
```

```
170TM CL BAND(a)   KPI=1+ BAND.
170TM2CL Configuration=(|p 7/2[523])-(|n 5/2[512]).
170TM CG E         From curved-crystal spectrometer data of 1996HO12, except
170TM2CG as noted, for secondary transitions; calibrated assuming E=50.7416 for
170TM3CG TM XKA1 line.
170TM4CG From 1968LO09 for primary transitions, except as noted.
170TM CG RI        Photon intensities/100 thermal n captures; from 1996HO12 for
170TM2CG secondary transitions, except as noted; from
170TM3CG 1968LO09 for primary transitions, except
170TM4CG as noted. Primary transition IG data are also available from 1968LO09
170TM5CG for resonant capture (3.92, 14.4, 17.5, 29.1, 34.8, 38.0, 44.8, 50.7,
170TM6CG 54+59.2, 63.0+65.8, 83.4, 93.5+94.0, 115, 125+132+136 EV resonances).
170TM CG M,MR      Based on ce data from 1996HO12.
170TM CG E(A)      Not reported in thermal n capture.
170TM CG E(C)      Apparent doublet (1968LO09); however, only one possible final
170TM2CG state in 170TM has been identified.
170TM CG RI(D)     Absolute IG from 1989DU03, scaled by a factor of 0.56 so
170TM2CG I(38G)=0.196 as reported in 1996HO12; includes 4% uncertainty in
170TM3CG absolute IG in 1989DU03 but not the 11% uncertainty in I(38G) in
170TM4CG 1996HO12.
170TM CG RI(E),M(E)$Divided intensity and mult for both components of doublet
170TM2CG deduced by 1996HO12 from subshell ratios for doublet,
170TM3CG assuming any E1 component to be pure. In the case of the 144.5G, the
170TM4CG E2 component was also assumed to be pure.
170TM CG M(F)      Based on CC<640 from intensity balance.
170TM CG M(G)      Based on CC<235 from intensity balance.
170TM CG M(H)      Based on CC<76 from intensity balance.
```

```
170TM CG RI(I)      From IG=0.403 7, EKC=0.0069 7 for the
170TM2CG doubly-placed transition and mult as indicated.
170TM CG RI(J)      Placements in level scheme require mult=E1 for 818 level and
170TM2CG mult=M1,E2 for 908 level. From I(ce) and IG one can deduce
170TM3CG IG(E1)=0.70 5, IG(M1)=0.26 6 for E1-M1, and IG(E1)=0.21 10,
170TM4CG IG(E2)=0.75 11 for E1-E2.
170TM CG E(K)       PLACED BY EVALUATOR BASED ON EG; UNPLACED IN 1996HO12.
170TM CG E(X)       From fig. 5 of 1996HO12; observed in GG coin only.
170TM CG M(Y)       Nonobservance of ce(K) line accompanied by significant IG
170TM2CG suggests mult=E1.
170TM  N 1.00       3
170TM CN NR         from 1996HO12, based on |S(TI feeding GS)=92%, which assumes
170TM2CN that AP 33% of unplaced gammas feed the GS; consistent
170TM3CN with data from 1966SH03. However, note that IG normalization=1.79
170TM4CN based on I(38.7G)=0.35 1 per 100 n captures from 1989DU03; source
170TM5CN of discrepancy not understood. SIGMAN=103 B (1984MUZY).
170TM PN                                                                    5
170TM  G 46.202    3 0.031   14
170TM  G 47.017    5 0.017    8
170TM  G 47.043    2 0.038   12
170TM  G 56.279    3 0.090    6
170TM  G 117.057   2 0.018    3
170TM  G 119.313   1 0.041    2 E2+M1    2.1      +9-5  1.66   7
170TM2 G EKC=0.86 8 $
170TM  G 124.875   1 0.056    3M1+E2     0.81     +19-161.55   4
170TM CG           EKC=1.09 8.
170TM  G 129.065   7 0.015    4
```

```
170TM  G 129.376   1 0.40     5E1                        0.170
170TM CG           EKC=0.029 4.
170TM  G 138.170   6 0.016    4
170TM  G 169.494   1 0.045    3 M1+E2     0.67   15    0.63   3
170TM CG           EKC=0.49 3; K:L1=0.492 10:0.095 13 (1994HOZZ).
170TM CG MR        from EKC. However, MR LE 0.15 from |a(L1)exp.
-----------------
170TM  G 1632.04   140.21     3
170TM  G 1658.65   130.23     3
170TM  L 0.0          1-                                          B
170TM  L 38.7139    5 (2)-                                        B
170TM  G 38.714    1 0.196   21 E2                       197
170TM CG           |a(L2)exp=68 7; L1:L2:L3:M1:M2:M3:M4:M5=5.80 12:67.6
170TM2CG 14:82.8 17: 0.979 20:17.5 4:22.4 4:0.300 18:0.311 12.
170TM3CG |a(L1)exp, |a(M1)exp inconsistent with other ce data; may
170TM4CG include impurities. Others: L1:L2:L3=100 15:1160 90:1450 110
170TM5CG (1967BA17).
170TM CG           OTHER EG: 38.713 2 (1966SH03), 38.712 6 (1989DU03).
170TM CG           OTHER IG: 0.170 17 (1966SH03); 0.35 1 (1989DU03).
170TM CG           Other mult: M1+E2 with MR=1.01 +11-8 from 1967BA17.
170TM  L 114.5440   6 (3)-                                       B
170TM  G 75.831    1 0.81     7M1+E2      0.85   5     7.97   7
170TM CG           |a(L2)exp=1.18 11; L1:L2:L3:M1:M2:M3=
170TM2CG 0.585 12:1.180 24:1.180 24:0.1070 21:0.269 5:0.284 6.
170TM3CG Other: L1:L2:L3=100 10:197 20:200 14 (1967BA17)
170TM CG           Other MR: 0.80 6 (1967BA17).
170TM  G 114.544   1 4.016   18 E2                       1.87
```

```
170TM CG           EKC=0.63 6; K:L1:L2:L3:M1:M2:M3=
170TM2CG 0.63 6:0.0702 21:0.305 6:0.280 6:0.0133 3:0.112 2:0.0725 15.
170TM  L 149.7180   6 (0)-                                              A
170TM  G 111.005   1 0.356   16 E2                      2.10
170TM CG           EKC=0.59 3; K:L1:L2:L3:M1:M2:M3=
170TM2CG 0.588 12:0.0637 13:0.369 7:0.604 12:0.0136 10:0.0866 17:0.0892 18.
170TM  G 149.718   1 6.5      5 M1                     1.01                 C
170TM CG           EKC=0.80 6; K:L1:L2:L3:M1:M2=
170TM2CG 0.795 16:0.1020 20:0.00882 18:0.00121 5:0.0225 5:0.00233 14.
170TM  L 183.1897  14 (4)-                                               B
170TM  G 68.6491   4 0.008    4E2                      13.9                @
170TMF G FLAG=E
170TML G FL=114.5440
170TM CG E         FROM 1994HOZZ; EG=68.649 0 IN 1996HO12.
170TM CG           For doublet: |a(L1)exp=0.074 4; L1:L2:L3:M1:M2:M3=
170TM2CG 0.0738 15:0.0422 8:0.0519 10:0.0131 10:0.0107 3:0.0137 4.
170TM  G 144.480   1 0.94    11E2                     0.804               @C
170TMF G FLAG=E
170TM CG E         144.480 1 for doublet.
170TM CG           For doublet ce data, see comment on 144.5G from 183.197
170TM2CG level.
170TM  L 183.197   4  (3)+             4.12 US   13                       Z
170TM CL T         from G(T) in (D,PG) and (N,G) E=thermal (1967AN04).
170TM2CL Other: 3.2 US 3 (delayed spectrum, 1970BH03).
170TM  G 68.6491   4 2.08    10E1                     0.90                @
170TMF G FLAG=E
170TM CG E         FROM 1994HOZZ; EG=68.649 0 IN 1996HO12.
```

```
170TM CG           For doublet ce data, see comment on 68.6G from 183.190
170TM2CG level.
170TM  G 144.480   1 5.0      3E1                        0.127                  @
170TMF G FLAG=E
170TM CG           For doublet, EKC=0.157 9; K:L1:L2:L3:M1:M2:M3=
170TM2CG 0.157 3:0.0150 3:0.0232 5:0.0204 4:0.00377 15:0.00629 13:0.00615 25.
170TM  L 204.4486   7 (2)-              1 NS      LT                            E
170TM CL T         from absence of delayed ce or G from level (1967AN04).
170TM  G 89.906    3 0.056    6M1                        4.32
170TM CG           EKC=4.4 4; K:L1:L2=4.44 9:0.388 12:0.081 8.
170TM CG M         M1 from EKC; however, L subshell data indicate some E2
170TM2CG admixture.
170TM  G 165.735   1 2.87    16M1(+E2)     0.7    LE     0.71   5               C
170TM CG           EKC=0.62 3; K:L1:L2:L3:M1:M2:M3=
170TM2CG 0.616 12:0.0772 15:0.00760 15:0.00214 15:0.0159
170TM3CG 5:0.00183 9:0.00064 10.
170TM CG MR        subshell data not mutually consistent; deduced MR values
170TM2CG range from 0 to 0.6 1.
170TM  G 204.448   1 6.58     4M1                        0.421                   C
170TM CG           EKC=0.341 17; K:L1:L2:L3:M1:M2=
170TM2CG 0.341 7:0.0466 9:0.00410 16:0.00063 8:0.01060 21:0.00119 14.
170TM  L 219.7060   6(2)-                                                       A
170TM  G 69.988    1 0.146   21 E2                      12.9
170TM CG           |a(L2)exp=4.0 6; L1:L2:L3:M1:M2:M3=
170TM2CG 0.261 10:3.95 8:4.00 8:0.053 5:0.885 18:0.992 20.
170TM  G 105.162   1 1.002   10M1+E2      0.4    3     2.72   3
170TM CG           EKC=1.84 9; K:L1:L2:L3:M1:M2:M3=
```

```
170TM2CG 1.84 4:0.236 5:0.0333 7:0.0213 9:0.0676 14:0.0147 13:0.0101 15.
170TM CG MR        based on 0.72 11 from EKC, 0.25 2 from M subshell
170TM2CG data, and 0.10 2 to 0.74 9 from L subshell data.
170TM  G 180.994   1 3.5      3 M1+E2     0.28   3     0.575  4              C
170TM CG           EKC=0.44 4; K:L1:L2:M1:M2:M3=
170TM2CG 0.443 9:0.0564 11:0.00745 15:0.01240 25:0.00184
170TM3CG 18:0.00102 9. Other: K:L1:L2=800 120:100 7:32 6
170TM4CG (1967BA17)
170TM CG           Other MR: 0.58 +12-7 (1967BA17).
170TM  G 219.705   1 2.701   22E2+M1      1.29   10    0.250  6              C
170TM CG           EKC=0.191 10; K:L1:L2:L3:M1:M2:M3=
170TM2CG 0.191 4:0.0240 5:0.0157 3:0.01150 23:0.0060 4:0.0041
170TM3CG 3:0.00280 25. Other: K:L1:L2:L3=630 60:100 10:65 10:45 10
170TM4CG (1967BA17)
170TM CG           Other MR: 1.32 +26-16 (1967BA17).
170TM  L 237.2396   6 (1)-                                              A
170TM  G 17.554    8 0.012   1  (M1(+E2))0.24    LT                     D
170TM3 G FLAG=F
170TM CG E         from 1989DU03.
170TM CG           CC(M1)=88, CC(E2)=10090.
170TM  G 87.521    1 1.29    3 M1                      4.66              C
170TM CG           EKC=3.98 20; K:L1:L2:M1:M2=
170TM2CG 3.98 8:0.577 17:0.0600 24:0.103 3:0.0171 14.
170TM  G 198.524   1 0.569   15M1                      0.457
170TM CG           EKC=0.411 21; K:L1:L2:M1:M2=
170TM2CG 0.411 8:0.0544 11:0.0035 6:0.0174 10:0.0024 5.
170TM  G 237.241   1 4.08     8M1                      0.280             C
```

```
170TM CG            |a(L1)exp=0.238 12; K:L1:L2:L3:M1:M2=
170TM2CG 0.238 5:0.0342 7:0.00241 17:0.00063 11:0.00658 26:0.00071 8.
170TM  L 247.147    6 (4)+                                                Z
170TM  G 63.959     4 0.177    23M1+E2       0.65          13.7           @
170TML G FL=183.197
170TMF G FLAG=E
170TM CG            For doublet: |a(L1)exp=0.93 11; L1:L2:L3:M1:M2:M3=
170TM2CG 0.930 19:1.60 3:1.99 4:0.172 3:0.355 7:0.372 7.
170TM CG MR         from authors' analysis (1996HO12).
170TM  G 63.959     4 0.027    4E1                    1.08           @
170TML G FL=183.1897
170TMF G FLAG=E
170TM CG            For doublet ce data, see comment on 64.0G to 183.197 level.
170TM  L 270.5466   8 (3)-                                                E
170TM  G 66.098     1 0.39     4M1(+E2)     0.33   LE    10.8   3
170TM CG            |a(L1)exp=1.42 14; L1:L2:L3:M1:M2:M3=
170TM2CG 1.42 3:0.575 12:0.573 11:0.275 6:0.157 3:0.155 3.
170TM  G 87.5                                                             X
170TML G FL=183.1897
170TM CG E          PRESUMABLY DIFFERS FROM 87.521G AND 87.571G SEEN IN SINGLES
170TM2CG SPECTRUM AND PLACED ELSEWHERE.
170TM  G 156.003    1 0.116    9M1+E2       0.32   7     0.87   1
170TM CG            EKC=0.45 4; K:L1:L2:M1=
170TM2CG 0.45 3:0.097 3:0.0170 26:0.027 3.
170TM CG MR         from |a(L2)exp; EKC and |a(M1)exp not consistent.
170TM  G 231.834    2 0.392    24M1                   0.298
170TM CG            EKC=0.254 15; K:L1:M1=0.254 5:0.0349 7:0.0092 8 (1994HOZZ).
```

```
170TM  L 319.3256   9 (5)-                                                  B
170TM  G 204.782   1 0.188   18E2                        0.242
170TM CG           EKC=0.127 17; K:L2=0.127 11:0.0269 13 (1994HOZZ).
170TM  L 349.7330   8 (3)-                                                  A
170TM  G 112.494   2 0.033    3 E2                       2.00
170TM CG           EKC=0.80 7; K:L3:M2=0.80 3:0.48 3:0.112 16 (1994HOZZ).
170TM  G 130.027   1 1.02     3M1+E2      0.55   9     1.42   2              C
170TM CG E         FROM 1994HOZZ; EG=130.027 0 IN 1996HO12.
170TM CG           EKC=1.09 5; K:L1:L2:M1:M2=
170TM2CG 1.090 22:0.145 3:0.0163 3:0.0313 6:0.0040 5.
170TM CG MR        from |a(L1)exp and EKC; |a(L2)exp inconsistent.
170TM  G 145                                                               X
170TM  G 235.193   2 0.942   24M1                        0.286               C
170TM CG           EKC=0.249 12; K:L1:L2=662 18:100:7.4 10 (1996HO12).
170TM  G 311.018   2 2.01     8M1(+E2)    0.23   LE    0.133  2             C
170TM CG           EKC=0.106 5; K:L1:L2:M1=0.1060 21:0.0157 3:0.0035:0.00348 14.
170TM  L 355.047    6 (4)+
170TM CL J         probable configuration=(|p 1/2[411])+(|n 7/2[633]) bandhead
170TM2CL (1996HO12).
170TM  G 107.901   2 0.038    3 E2+M1    1.3     +3-4  2.42   3
170TM CG           EKC=1.37 14.
170TM  G 171.855   1 0.056    9E1                        0.0802              @
170TML G FL=183.1897
170TMF G FLAG=E
170TM CG           For doublet ce data, see comment on 171.9G to 183.197 level.
170TM  G 171.855   1 0.27     3M1(+E2)    0.20          0.674               @
170TML G FL=183.197
```

```
170TMF G FLAG=E
170TM CG           For doublet: EKC=1.38 12 (1994HOZZ,1996HO12); K:L1:L2:M1:M2=
170TM2CG 1.38 3:0.0741 15:0.0103 11:0.0152 8:0.0052 10 (1994HOZZ). HOWEVER, EKC
170TM3CG APPEARS TO BE TOO HIGH AND IS INCONSISTENT WITH L1/K=0.17 3 IN
170TM4CG 1966HO12; THE LATTER IMPLIES EKC AP 0.44 BASED ON EL1C=0.0741 15 IN
170TM5CG 1994HOZZ.
170TM CG MR        from authors' analysis (1996HO12).
170TM  L 358.1163   9 (4)-                                                  E
170TM  G 87.571    2 0.219    6M1+E2      0.27         5.17
170TM CG           |a(L3)exp=0.103 6; L3:M2:M3=0.103 5:0.051 11:0.049 6
170TM2CG (1994HOZZ).
170TM CG MR        from |a(L3)exp; however, MR=0.38 7 from |a(M2)exp, 0.40 6
170TM2CG from |a(M3)exp and 0.15 5 from L3/M2.
170TM  G 153.667   1 0.101    8 E2                      0.64
170TM CG           EKC=0.350 25; K:L1=0.350 7:0.084 14 (1994HOZZ).
170TM CG M         EKC consistent with pure E2 (expected from placement);
170TM2CG |a(L1)exp implies MR(E2,M1)=0.7 4 suggesting ce line contamination.
170TM  G 174.927   2 0.028    3 M1+E2                   0.53   12
170TML G FL=183.1897
170TM CG           EKC=0.40 4: K:L1=0.403 12:0.081 10 (1994HOZZ).
170TM CG MR        0.9 3 from EKC; LE 0.4 from |a(L1)exp.
170TM  G 243.573   3 0.036    5 M1+E2    0.9     +4-3  0.21   3
170TM CG           EKC=0.166 23.
170TM  L 381.4258   8 (4)-                                                 A
170TM  G 31.713     90.013    1 (M1(+E2))0.87    LT                        D
170TMF G FLAG=G
170TM CG E         FROM 1989DU03.
```

```
170TM CG           CC(M1)=15.1, CC(E2)=529.
170TM  G 161.721   1 0.228   11E2                        0.54
170TM CG           |a(L2)exp=0.067 4; L1:L2:L3=
170TM2CG 0.0314 16:0.067 3:0.0629 13.  L1/K=0.033 2 (1996HO12).
170TM CG M,MR      E2(+M1), MR GE 2.2 from (N,G) consistent with pure E2
170TM2CG as required by placement.
170TM  G 198.237   2 0.071    4E2+M1      1.23   +25-190.34   2
170TML G FL=183.1897
170TM CG MR        from EKC; however, |a(L1)exp gives 0.54 19.
170TM CG           EKC=0.255 18; K:L1=0.255 10:0.045 4 (1994HOZZ).
170TM  G 266.881   1 0.130   14M1+E2     0.9     3     0.158  19
170TM CG           EKC=0.126 14;
170TM2CG K:L1:L2:M1=0.126 4:0.0176 23:0.0050 23:0.0063 19 (1994HOZZ).
170TM  G 342.711   4 0.106    5 E2                       0.0485
170TM CG           EKC=0.0309 25.
170TM  L 402.7281  19 (3,4)-
170TM  G 288.185   2 0.095    8 M1+E2    0.64    20    0.141  11
170TM CG           EKC=0.115 10; K:L1=0.115 5:0.016 3 (1994HOZZ).
170TM  G 364.012   4 0.014    1
170TM  L 447.0707   8 (3)-                                                J
170TM  G 88.954    1 0.035    7 M1                       4.45
170TM CG           |a(L1)exp=1.02 20; L1:M1:M2=1.02 4:0.21 3:0.139 13
170TM2CG (1994HOZZ).
170TM  G 176.525   1 0.294    9M1+E2      0.65   12    0.56    2
170TM CG           EKC=0.443 22; K:L1:L2:L3:M1=
170TM2CG 0.443 9:0.0530 11:0.0133 12:0.0075 9:0.0092 9.
170TM CG MR        from EKC; however, subshell ratios do not give an
```

```
170TM2CG internally consistent value for MR.
170TM  G 242.623   1 0.910   16M1(+E2)    0.30   +15-300.25   1                C
170TM CG           EKC=0.210 11; K:L1:L2:L3:M1=
170TM2CG 0.210 4:0.0303 9:0.0073 8:0.0020 3:0.0074 3.
170TM  G 263.877   5 0.016    1
170TML G FL=183.1897
170TM  G 332.522   5 0.035    1 M1(+E2)  0.60    LE    0.105  8
170TM CG           EKC=0.088 8.
170TM  G 408.348   3 0.143    2 M1+E2    0.47    13    0.059  3
170TM CG           EKC=0.0493 25.
170TM  L 467.8607  12 (5)-                                                  E
170TM  G 109.744   3 0.021    4
170TM  G 197.314   1 0.028    3 E2                     0.274
170TM CG           EKC=0.17 3.
170TM  L 539.7223  17 (4)-                                                  J
170TM  G 92.654    3 0.073    5 M1+E2     0.23   3     3.97
170TM CG           EKC=3.38 20; K:L1:L2=3.38 7:0.412 8:0.085 12.
170TM CG MR        from L1/L2.
170TM  G 269.173   2 0.063    8M1+E2     1.0     4     0.149  23
170TM CG           EKC=0.121 16; K:L1=0.121 5:0.024 4 (1994HOZZ).
170TM  G 335.274   8 0.012    2
170TM  L 544.050    8 (3+)
170TM  G 505.344   150.106    7
170TM  G 544.043   110.060    3
170TM CG           EKC=0.0187 21.
170TM CG M,MR      E2+M1 (MR=1.0 +4-3) from EKC is inconsistent with
170TM2CG placement; either the G is misplaced or the mult is incorrect.
```

```
170TM  L 550.7473  17 (5)-                                                  A
170TM  G 169.321   2 0.022   3 M1+E2     0.7     +4-3  0.63   7
170TM CG           EKC=0.49 7.
170TM  G 192.633   3 0.016   1 M1                      0.497
170TM CG           EKC=0.47 4.
170TM  G 231.418   6 0.010    1
170TM  G 367.556   4 0.084    4 M1+E2     0.34    +16-250.082  5
170TML G FL=183.1897
170TM CG           EKC=0.068 4.
170TM  L 590.2286  17 (1)-                                                  C
170TM  G 352.997   9 0.46     3 M1+E2     0.63    13    0.081  5
170TM CG           EKC=0.067 4; K:L1=0.0673 13:0.0096 5 (1994HOZZ).
170TM  G 370.530   4 0.088    4 M1+E2     0.38    +15-250.079  5
170TM CG           EKC=0.066 4.
170TM  G 440.516   5 0.048    3 M1                      0.054
170TM CG           EKC=0.051 9.
170TM  G 475                                                             X
170TM  G 551.514   3 0.973   15 M1+E2     0.70    11
170TM CG           EKC=0.0206 10; K:L1=0.0206 4:0.00302 6 (1994HOZZ).
170TM  G 590.226   6 1.21     3 M1(+E2)
170TM CG           EKC=0.0188 9; K:L1=0.0188 4:0.00336 24 (1994HOZZ).
170TM CG MR        0.52 12 from EKC; however, |a(L1)exp indicates pure
170TM2CG M1.
170TM  L 6593.8    14 0+,1+                                                    S
170TM CL E         cf. SN=6593.3 11 (1995AU04).
170TM CL J         L=0 neutron capture by JPI=1/2+ target.
170TM  G 6003      3 0.600   15
```

```
170TM  G 6356      3 0.190   12
170TM  G 6375      3 0.079   16
170TM CG RI        from 1966SH03.
170TM  G 6389      3  0.800  14
170TM  G 6444.2    10 0.200  11
170TM CG E         from 1966SH03.
170TM  G 6556.4    5  0.490  15
170TM CG E         from 1966SH03.
170TM  G 6594      3  0.021  10
```

^{169}Tm(n,γ) E=thermal: two-photon cascades

```
170TM    169TM(N,G) E=THERMAL: G COIN  1996VA23,1996HO12
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170TM C  Others: 2001VA11 (level density and strength function deductions from
170TM2C  two-photon cascade data), 1999BO14.
170TM C  This dataset contains (N,G) E=thermal data obtained from measurements
170TM2C  of two-photon cascades only; for all other (N,G) E=thermal data,
170TM3C  please see the (N,G) E=0-136 EV dataset.
170TM C  1996VA23: EN=thermal; GELI and HPGe detectors, FWHM=3-4 KEV at E=1332,
170TM2C  time resolution 10-12 NS; measured EG, (high-energy G)-(low-energy G)
170TM3C  coin, I(GG coin) for two-photon cascades from capture state.
170TM C  1996VA23 and 1996HO12 have several authors in common and report on
170TM2C  the same two-photon cascade experiment. Apparently 1996HO12 present
170TM3C  only a subset of the data reported in 1996VA23; however, both EG and
170TM4C  IG data differ slightly from one paper to the other. The order in
170TM5C  which these papers were submitted for publication is unclear, so the
```

```
170TM6C  evaluator has chosen to present the data from the much more extensive
170TM7C  listing in 1996VA23. The differences between the two sets of data
170TM8C  are almost never of statistical significance.
170TM CG RI        1996VA23 report (high-energy G)-(low-energy G) coincidence
170TM2CG photon intensities, normalized so the area of the experimental
170TM3CG distribution in the interval 520<EG<(E(cascade)-520) is 100% for each
170TM4CG two-photon energy-sum gated spectrum. Data were reported for 14 strong
170TM5CG energy sums, corresponding to two-photon cascades terminating at
170TM6CG the GS and the 39, 115, 150, 183, 204, 220, 237, 271, 350, 447, 590,
170TM7CG 604 and 638?+649+650 levels. For completeness, these sum spectrum
170TM8CG intensities are shown here under the label I{-|g1|g2} opposite
170TM9CG the relevant G{-2} energy. Note that, due to experimental conditions,
170TMACG these intensities are only lower limits if EG<520 for one of the
170TMBCG coincident gammas (1996HO12); this affects a number of transitions
170TMCCG deexciting levels with E LE 760.
170TM CG RI$LABEL=I{-|g1|g2}
170TM CL E         From 1996VA23. In many cases, E(level) values based on a
170TM2CL least-squares adjustment of EG have significantly smaller
170TM3CL and apparently less realistic uncertainties; also, it should be noted
170TM4CL that an extraordinarily large number of EG data differ
170TM5CL by at least 4|s from the least-squares adjusted values.
170TM CG E         From 1996VA23. EG values for many secondary gammas differ
170TM2CG significantly (GE 4|s) from the least-squares adjusted values; such
170TM3CG cases are noted. The EG values given for the primary gammas are the
170TM4CG average of all values listed in 1996VA23. The authors do not give
170TM5CG uncertainties for these; it should be noted, however, that in the
170TM6CG worst cases, there can be a 6 KEV spread in the values averaged.
```

```
170TM7CG Data for unplaced gammas are not included here; please see 1996VA23
170TM8CG for those (AP 80 GAMMA pairs).
170TM CG E(A),RI(A)$From 1996HO12. Not reported in 1996VA23.
170TM CL E(B)       Rounded-off value from adopted levels.
170TM CG E(C)       1996VA23 place a 428.6G and a 532.6G from an otherwise
170TM2CG unknown E=647.9 6 level, but 1996HO12 place them from the adopted
170TM3CG 648.75 level which is known to be deexcited by a 429.0G.
170TM CG E(D)       Value differs by at least 4|s from that expected based on
170TM2CG least-squares adjusted level energies.
170TM3CG Possibly the precision of EG data has been overestimated
170TM4CG for some secondary transitions. Almost certainly, some closely-spaced
170TM5CG intermediate or final levels involved in the cascades have not been
170TM6CG resolved; for example, a large number of transitions to E(level) AP 640
170TM7CG KEV may be unresolved doublets comprised of G's feeding the adopted
170TM8CG 648.7 and 637.9 levels.
170TM CL E(E)       Added by evaluator. Although 1996VA23 do not include this
170TM2CL level and the spread of EG(primary) values suggests that only the
170TM3CL 648.6 level is significantly populated by the relevant primary G,
170TM4CL many G's which feed a level in the vicinity of 640 KEV have EG values
170TM5CL intermediate between those expected for transitions to the 648.6 and
170TM6CL 637.9 levels.
170TM CL E(Y)       From SN (1995AU04).
170TM CL J(Z)       L=0 neutron capture by JPI=1/2+ target.
170TM PN                                                                C6
170TM2PN I{-|g1|g2}
170TM  L 0.0
170TM  L 38.7                                                           B
```

```
170TM  L 114.5                                                          B
170TM  L 149.7                                                          B
170TM  L 183.20                                                         B
170TM  L 204.4                                                          B
170TM  L 219.7                                                          B
170TM  L 237.2                                                          B
170TM  L 270.5                                                          B
170TM  L 349.7                                                          B
170TM  L 447.1                                                          B
170TM  L 589.7       6
170TM  G  352.7      2 2.6      4
170TM  G  369.7      4 1.4      3
170TM  G  439.1      3 1.7      4
170TM  G  476.1      4 0.7      2
170TM CG E           presumably the 475G from GG coin in fig. 5 of 1996HO12.
170TM  G  551.4      1 8.0      5
170TM  G  589.7      1 6.8      4
.
.
.
170TM  L 6593.3     11 0+,1+                                              S
170TM3 L FLAG=YZ
170TM  G  6004.1
170TM DG            FL=589.7
```

^{169}Tm(n,γ) E=2, 24 keV

```
170TM    169TM(N,G) E=2, 24 KEV          1996HO12
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170TM C  Target JPI=1/2+.
170TM C  1996HO12: three-crystal pair spectrometer, FWHM=5.5 KEV at 6.5 MEV;
170TM2C  oxide target; measured EG, IG for average resonance capture primary
170TM3C  transitions; deduced ^S(n)=6591.8 12 (cf. 6593.3 11 in 1995AU04).
170TM4C  Supersedes 1994HOZZ.
170TM CL E          Authors' best values based on both 2-KEV and 24-KEV data,
170TM2CL except as noted. EG data for primary transitions
170TM3CL are based on a chlorine calibration, and DE
170TM4CL ranges between 0.1 KEV and 1.6 KEV for these. E(level) values from
170TM5CL these data deviate by at most 1.2 KEV from adopted values for E<1160.
170TM6CL The evaluator, therefore, assigns DE=1.5 KEV to E(level) values which
170TM7CL have been adopted from this data set. Note that the level indicated
170TM8CL at 1.2 KEV is, in reality, the ground state.
170TM CL J          J LE 2 is expected for all levels fed by primary gammas
170TM2CL in this reaction. PI is based on reduced intensity of primary G
170TM3CL feeding level (PI=+ states are less strongly fed).
170TM CG RI$LABEL=IG/(EG{+5})
170TM CG RI         Reduced photon intensity (i.e., IG/(EG{+5})) for EN=2 KEV.
170TM CG TI$LABEL=IG(2)/IG(24)
170TM CG TI         G intensity for E(n)=2 KEV divided by G intensity for
170TM2CG E(n)=24 KEV.
170TM CG E(A)       Doublet.
170TM CL E(A)       Based on EG for 14 strong primary transitions in the 2-KEV
170TM2CL measurements and the knowledge that the effective neutron energy
```

```
170TM3CL would be AP 1.2 KEV (presumably as a result of moderation of the
170TM4CL neutrons in the target assembly), 1996HO12 deduce SN=6591.8 9 (cf.
170TM5CL 6593.1 11 in 1995AU04). The evaluator, therefore, estimates
170TM5CL E=(6591.8+1.2) for the capture state in the 2-KEV measurement and
170TM6CL assigns an uncertainty of 2 KEV. Since the effective neutron energy
170TM7CL for the 24-KEV measurement is not known, the evaluator estimates
170TM8CL the capture state(s) energy from EG for the primary to the GS and
170TM9CL again assigns an uncertainty of 2 KEV.
170TM CL J(J)      Reduced IG(E(n)=2 KEV) for primary G to this level favors
170TM2CL PI=+, but DRI is unstated.
170TM  N
170TM PN                                                                  C5
170TM2PN REDUCED INTENSITY, IG/EG{+5} FOR EN=2 KEV
170TM  L 1.2         4 (LE 2-)
170TM  L 39.6        1 (LE 2-)
170TM  L 150.0       2 (LE 2-)
170TM  L 203.8       2 (LE 2-)
170TM  L 219.9       2 (LE 2-)
170TM  L 237.3       1 (LE 2-)
170TM  L 589.7       1 (LE 2-)
170TM  L 6593        2                                                     S
170TMF L FLAG=A
170TM CL E         resonance capture state(s) for average n energy of 2 KEV.
170TM  G 6012.4      3                                          0.17      2
170TM  G 6026.8      1                                          0.46      7
170TM  G 6379.2      1                                          0.39      6
170TM  G 6397.1      1                                          0.25      4
```

```
170TM  G 6412.7     1                                                0.41       6
170TM  G 6466.8     1                                                0.39       6
170TM  G 6577.8     1                                                0.45       6
170TM  G 6616.3     1                                          0.30       4
```

^{169}Tm(d,p)

```
170TM    169TM(D,P)                          1996HO12,1966SH03,1966RY01
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170TM C  Target JPI=1/2+.
170TM C  1996HO12: E=12, 20, 26 MEV; |q(lab)=20|', 25|', 30|', 40|',
170TM2C  45|'; magnetic spectrograph; measured E(p), d|s/d|W(|q).
170TM4C  Supersedes 1995HOZZ.
170TM C  1966SH03: E=12 MEV; measured |s(E(p),|q) in 5 DEG steps from
170TM2C  10|' to 45|' and 10|' steps from 45|' to 135|', magnetic
170TM3C  spectrograph with nuclear emulsions, FWHM|?12 KEV; DWBA analysis.
170TM C  1966RY01: E=11, 12 MEV; narrow range magnetic spectrograph,
170TM2C  FWHM AP 18 KEV; measured |s(E(p)), |q=90|' for
170TM3C  11 MEV, |q=90, 60 DEG for 12 MEV.
170TM CL E          From 1996HO12. Other data are given in comment on relevant
170TM2CL level. (For data from 1966SH03, DE for E LE 270 is statistical
170TM2CL uncertainty only, and reasonable DE for E>350 is 1 to 4 KEV. E from
170TM3CL 1966RY01 is quoted relative to E=0 for g.s.)
170TM CL L          From DWBA analysis of |s(|q) (1966SH03).
170TM CL S$LABEL=d|s/d|W(30 DEG)
170TM CL S          d|s/d|W(30|') in |mb/sr for E(d)=20 MeV (1996HO12). See
```

Relabel ‘S’ field

```
170TM2CL 1996HO12 for additional cross section data for E(d)=12 MeV (45|'),
170TM3CL E(d)=20 MeV (20|', 40|') and E(d)=26 MeV (25|').
170TM CL BAND(A)   KPI=0- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 1/2[521])
170TM CL BAND(B)   KPI=1- GS BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 1/2[521])
170TM CL BAND(E)   KPI=2- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 5/2[512])
170TM CL BAND(J)   KPI=3- BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 5/2[512])
170TM CL BAND(O)   KPI=1- BAND.
170TM2CL Configuration=(|p 3/2[411]-(|n 5/2[512]) plus (|p 1/2[411])+(|n
170TM3CL 1/2[510]) plus ((|p 1/2[411])-(|n 5/2[512])-|g vibration).
170TM CL BAND(T)   KPI=1- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 3/2[521]) plus (|p 7/2[404])-(|n
170TM3CL 5/2[512]) plus (|p 3/2[411])-(|n 1/2[521]).
170TM CL BAND(U)   KPI=2- BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 3/2[521]) plus (|p 3/2[411])+(|n
170TM3CL 1/2[521]) plus ((|p 1/2[411])+(|n 1/2[521])-|g vibration).
170TM CL BAND(Z)   KPI=3+ BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 7/2[633])
170TM CL BAND(b)   KPI=4+ BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 7/2[633])
170TM  L -0.03     18                                  1        112       3 B
170TM CL           Ground state. Other E: 2.5 15 (1966SH03).
170TM  L 38.8       3                                  1        17.1      15B
170TM CL           Other E: 39.5 6 (1966SH03); 38 3 (1966RY01).
```

```
170TM  L 114.30    19                                    3        29.9      17B
170TM CL           Other E: 115.0 6 (1966SH03); 115 3 (1966RY01).
170TM  L 149.80     9                                    1        71        3 A
170TM CL           Other E: 149.6 3 (1966SH03); 153 3 (1966RY01).
170TM  L 183.21    15                                    3        27.0      16B
170TM CL           Other E: 183.3 6 (1966SH03); 185 3 (1966RY01).
170TM  L 204.73    21                                             14.0      12E
170TM CL           Other E: 208.2 9 (1966SH03; 45|' spectrum only).
170TM  L 219.68    12                                             29.6      20A
170TM CL           Other E: 218.2 12 (1966SH03); 226 6 (1966RY01).
170TM  L 237.21    16                                    1        84        4 A
170TM CL           Other E: 236.6 3 (1966SH03); 240 3 (1966RY01).
170TM  L 247.0      5                                             9.4       20Z
170TM  L 270.49    12                                             219       13E
170TM CL           Other E: 269.6 3 (1966SH03); 274 4 (1966RY01).
170TM  L 318.6      5                                             3.9       8 B
170TM  L 327.1      7                                                         Z
170TM CL           Other E: 329 5 (1966RY01).
170TM  L 349.68    20                                             55.3      20A
170TM  L 358.38    23                                             45.0      23E
170TM CL           Other E: 353 (1966SH03); 357 4 (1966RY01).
170TM  L 381.47    18                                             43.6      21A
170TM CL           Other E: 380 (1966SH03); 384 4 (1966RY01).
170TM  L 409.4      8                                             4.0       10B
170TM  L 419.2      5                                             8.0       13
170TM  L 426.5      3                                             17.0      15Z
170TM CL           Other E: 427 (1966SH03);
```

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170TM  L 439.8      4                                                  19.6       17b
170TM  L 446.93    17                                                  29.5       19J
170TM CL           Other E: 446 (1966SH03); 443 5 (1966RY01).
170TM  L 456.8      8                                                  7.8        11
170TM  L 467.1      3                                                  12.3       13E
170TM  L 476.9      5                                                  2.6        7
170TM  L 539.83    23                                                  270        6 J
170TM CL           Other E: 542 (1966SH03).
170TM  L 545.05    17
170TM  L 550.0      8                                                  13.9       13A
```

↑ No Jπ ↑ Record L ↑ No S, so give dσ/dω

^{170}Er(^{3}He,t)

```
170TM    170ER(3HE,T)                      1983JA03
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170TM C  E(3HE)=60.5 MEV; magnetic spectrograph, 96.1% 170ER target,
170TM2C  |q(lab)=0|'; measured reaction Q and |G for IAS.
170TM  L 15492      7 0+                104 KEV   8
170TM CL E         from reaction Q of -15825 KEV 6.
170TM CL J         isobaric analog of 170ER G.S.
```

^{170}Tm(d,d')

```
170TM    170TM(D,D')                       1968FR01
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170TM C  E(d)=12 MeV; measured |s(E(d'),|q), |q=90|', 125|', 150|'.
```

```
170TM CL J          Authors' values, based on comparison of |s(|q) and
170TM2CL E(level) with E, |s(|q) and excitation probability expected on the
170TM3CL basis of likely collective band structure.
170TM CL BAND(A)    KPI=1- BAND
170TM CL BAND(B)    KPI=0- BAND
170TM CL BAND(Z)    POSSIBLE KPI=1- GAMMA-VIBRATIONAL BAND (1968Fr01).
170TM2CL Band assignment not adopted by evaluator.
170TM CL BAND(Y)    POSSIBLE KPI=3- GAMMA-VIBRATIONAL BAND (1968Fr01).
170TM CL E(D)       Rounded-off value from adopted levels.
170TM  L 0.0           1-                                              A
170TM  L 39            2-                                              A
170TM3 L FLAG=D
170TM  L 115           3-                                              A
170TM3 L FLAG=D
170TM  L 182.0       9 4-                                              A
170TM  L 220           2-                                              B
170TM3 L FLAG=D
170TM  L 320.0      16 5-                                              A
170TM  L 380.0      19(4-)                                             B
170TM  L 411.0      21 6-                                              A
```

^{171}Yb(t,α)

```
170TM    171YB(T,A)                      1981DE29
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
```

```
170TM C  Target JPI=1/2-.
170TM C  E=17 MEV; 88.2% 171YB target, FWHM|?16 KEV, Q3D spectrometer;
170TM2C  measured EA and |s(|q) in 5|' steps from 15|' to 50|';
170TM3C  DWBA analysis of |s(|q); assigned Nilsson configurations.
170TM CL J         Authors' values, based on |s(|q), and on band
170TM2CL configuration analysis. Note that several of these differ from
170TM3CL values in adopted levels.
170TM CL L         Based on comparison of measured |s(|q) with DWBA
170TM2CL calculations (normalization factor=5.5).
170TM CL S$LABEL=d|s/d|W(30 DEG)
170TM CL S         d|s/d|W(30|') in |mb/sr; uncertainties not stated by
170TM2CL authors.
170TM CL BAND(A)   KPI=0- BAND.
170TM2CL Configuration=((|p 1/2[411])-(|n 1/2[521])).
170TM CL BAND(B)   KPI=1- GS BAND.
170TM2CL Configuration=((|p 1/2[411])+(|n 1/2[521])).
170TM CL BAND(C)   KPI=1- BAND.
170TM2CL Configuration=((|p 3/2[411])-(|n 1/2[521])).
170TM CL BAND(E)   KPI=2- BAND.
170TM2CL Configuration=((|p 1/2[411])-(|n 5/2[512])). The authors note that this
170TM3CL configuration can not be excited in (T,A) via a one-step mechanism;
170TM4CL the admixture of configuration=((|p 5/2[413])-(|n 1/2[521])) required
170TM5CL for consistency with experiment is much larger than predicted by
170TM6CL authors' residual interaction mixing calculations.
170TM CL BAND(F)   KPI=2- BAND.
170TM2CL Configuration=((|p 5/2[402])-(|n 1/2[521])).
170TM3CL Level's excitation is stronger than expected for this configuration.
```

```
170TM CL BAND(G)   KPI=2- BAND.
170TM2CL Configuration=((|p 3/2[411])+(|n 1/2[521])).
170TM CL BAND(I)   KPI=2- BAND.
170TM2CL Configuration=((|p 5/2[413])-(|n 1/2[521])).
170TM CL BAND(J)   KPI=3- BAND.
170TM2CL Configuration=((|p 1/2[411])+(|n 5/2[512])). The authors note that this
170TM3CL configuration can not be excited in (T,A) via a one-step mechanism;
170TM4CL the admixture of configuration=((|p 5/2[413])+(|n 1/2[521])) required
170TM5CL for consistency with experiment is much larger than predicted by
170TM6CL authors' residual interaction mixing calculations.
170TM CL BAND(K)   KPI=3- BAND.
170TM2CL Configuration=((|p 7/2[404])-(|n 1/2[521])).
170TM CL BAND(L)   KPI=3- BAND.
170TM2CL Configuration=((|p 5/2[402])+(|n 1/2[521])).
170TM3CL Level's excitation is stronger than expected for this configuration.
170TM CL BAND(M)   KPI=3+ BAND.
170TM2CL Configuration=((|p 7/2[523])-(|n 1/2[521])).
170TM CL BAND(N)   KPI=3- BAND.
170TM2CL Configuration=((|p 5/2[413])+(|n 1/2[521])).
170TM CL BAND(o)   KPI=4- BAND.
170TM2CL Configuration=((|p 7/2[404])+(|n 1/2[521])).
170TM CL BAND(P)   KPI=4+ BAND.
170TM2CL Configuration=((|p 7/2[523])+(|n 1/2[521])).
170TM CL BAND(Y)   KPI=1- BAND. GAMMA-VIBRATION BUILT ON KPI=1- GS BAND.
170TM  L 0.0          1-                                        6.9         B
170TM  L 40.0      18 2-                                        44.2        B
170TM  L 114.7     18 3-                                        4.6         B
```

170TM	L	148	4	0-		2.2	A
170TM	L	182	3	4-		5.1	B
170TM	L	194	6	(2-)			E
170TM	L	220.1	9	2-		32.9	A
170TM	L	238.6	18	1-	2	20.4	A
170TM	L	270.4	10	(3-)		1.3	E
170TM	L	318	15	(5-)		4.4	B
170TM	L	332	5			5.0	
170TM	L	351	3	3-		12.3	A
170TM	L	381	3	4-		2.4	A
170TM	L	420	7			2.0	AP
170TM	L	449	20	(3-)		3.0	APJ
170TM	L	559	8	(5-)		3.0	APA

^{170}Er(γ,γ'), (γ, pol γ') (resonance fluorescence)

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TABLE III. Results for the reaction ^{170}Er(γ,γ'). The measured excitation energies E_x, the integrate scattering cross sections I_s, and decay branching ratios R_{expt} are summarized. Ground-state transition width Γ_0, spins J, and K quantum numbers were deduced. Quoted parities are taken from Refs. [10,11]. Th quoted reduced transition probabilities $B(M1)\uparrow$ and $B(E1)\uparrow$, given in the table, were calculated assumin negative parities for $K=0$ levels and positive parities for $K=1$ levels, respectively. For levels which do nc exhibit a decay branching to the first 2^+ state reduced transition probabilities are alternatively given for bot parities.

E_x [keV]	I_s [eV b]	Γ_0 [meV]	R_{expt}	K	Spin J^π	$B(M1)\uparrow$ [μ_N^2]	$B(E1)\uparrow$ [10^{-3} e^2 fm^2]
1825	41.7±6.5	31.8±5.5	1.87±0.09	0	1^-	-	14.99±2.59
2133	9.5±1.2	3.8±0.9	-	-	1	0.100±0.025	1.11±0.27
2701	13.4±1.7	12.5±2.5	0.52±0.08	1	1	0.164±0.033	-
2789	38.5±2.2	41.3±3.9	0.64±0.04	(1)	1^+	0.493±0.047	-
2897	6.4±1.3	4.7±1.4	-	-	1	0.050±0.015	0.55±0.16
2930	4.5±0.9	8.4±2.7	1.68±0.39	0	1	-	0.96±0.31
2938	7.6±1.1	9.1±2.6	0.65±0.15	1	1	0.093±0.027	-
3019	17.4±1.4	13.8±3.1	-	-	1	0.130±0.029	1.43±0.32

$\Gamma\gamma_0^2/\Gamma = 0.26\ E_\gamma^2\ I_s / (2J+1)$ meV $\Gamma\gamma_1/\Gamma\gamma_0 = R_{expt}\ (E\gamma_1/E\gamma_0)^3$

$\Gamma = \Gamma\gamma_0^2/\Gamma \times (1+\Gamma\gamma_1/\Gamma\gamma_0)^2$ if $\Gamma=\Gamma\gamma_0+\Gamma\gamma_1$; $T_{1/2}$ (ps) = 0.4561 / Γ (meV)

```
170ER    170ER(G,G'), (G,POL G')        1996MA18,1976ME04
170ER  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
170ER C  Others: 1973ME17, 1991ZI01.
170ER C  1996MA18: bremsstrahlung endpoint energy=3.80 MEV; 96.9% 170ER
170ER2C  oxide target; HPGe detector, 3 Ge detectors, true-coaxial HPGe
170ER3C  COMPTON polarimeter with 8-crystal ^BGO COMPTON shield; |q=95 DEG,
170ER4C  127 DEG; measured EG, integrated cross section, G anisotropy, G
170ER5C  polarization; deduced WIDTH0, |G{-|g0}{+2}/|G, |G{-|g1}/|G{-|g0},
170ER6C  JPI, K.
170ER C  1991ZI01: measured 1824G(|q), |G{-|g0}{+2}/|G; deduced |G{-|g0}.
170ER C  1976ME04: E(e)=1.6-4.2 MEV bremsstrahlung; 96.9% 170ER target;
170ER2C  measured |s(E; EG,|q), |q=98|' and 127|', and G linear polarization.
170ER C  1973ME17: E(e)=1.93 MEV bremsstrahlung; 96.9% 170ER target; measured
170ER2C  E|g', G(|q) (|q=98 DEG and 127 DEG), G linear polarization.
170ER CL           Values of K, deduced by 1996MA18 from measured
170ER2CL |G{-|g1}/|G{-|g0}, are given in comments on the relevant levels.
170ER CL E         From 1996MA18 if DE unstated, from 1976ME04 if DE=2.
170ER CL J         J from G(|q) and PI from G linear polarization, except
170ER2CL as noted; only states having J=1 or 2 can be excited (1976ME04).
170ER CL T         Deduced from |G{-|g0}{+2}/|G and adopted G-ray branching
170ER2CL assuming |G=|G{-|g0}+|G{-|g1}; consequently, these represent upper
170ER3CL limits for any level which has significant branching to states other
170ER4CL than the ground or first excited states.
170ER CL S$LABEL=|G{-|g0}{+2}/|G (meV)
170ER CL S         From 1996MA18, except as noted. Calculated by evaluator
170ER2CL from integrated cross section data of 1996MA18 assuming J indicated,
170ER3CL unless indicated otherwise.
```

```
170ER CG RI        Relative branching, based on measured |G{-|g1}/|G{-|g0}.
170ER2CG Calculated by evaluator from R=(|G{-|g1}/|G{-|g0})(E{-|g0}/E{-|g1}){+3}
170ER3CG in 1996MA18, except as noted.
170ER CG E         From E(level) difference, except for 1824G (from 1991ZI01).
170ER2CG Presumably DE{-|g} LE 2 KEV for transitions from levels given in
170ER3CG 1976ME04 since authors indicate |DE(level)=2 KEV. 1996MA18 do not
170ER4CG state uncertainty, but their level energies are within 1 KEV of
170ER5CG those from 1976ME04 for levels reported in both studies.
170ER CG M         DJ from G anisotropy (1996MA18), except as noted. DPI
170ER2CG from linear polarization (1976ME04).
170ER CG RI(A)     Weak
170ER CL E(A),J(A)$From adopted levels.
170ER CL E(B),J(B)$From 1973ME17.
170ER CG RI(B),M(B)$From 1973ME17.
170ER CL T(D)      From weighted average of |G=0.080 EV 7 (from adopted
170ER2CL |G{-|g0}/|G and (|G{-|g0}){+2}/|G=11.6 meV 10 (1973ME17,1996MA18))
170ER3CL and 0.094 EV 7 (from |G{-|g1}/|G{-|g0}=1.64 7 and |G{-|g0}=35.8 meV 24
170ER4CL (1991ZI01)).
170ER PN                                                              6
170ER  G  3059
170ER CG           (|G{-|g0}){+2}/|G=5 meV (1976ME04) if J=1 to GS transition.
170ER  G  3157
170ER CG           (|G{-|g0}){+2}/|G=14 meV if J=1 to GS transition; however,
170ER2CG this G probably includes a contribution from the 3238 to 79 transition.
170ER  G  3237
170ER CG           (|G{-|g0}){+2}/|G=18 meV if J=1 to GS transition; however,
170ER2CG probable doublet feeding GS and 79 level (1976ME04). Too strong for
```

```
170ER3CG known (1996MA18) transition to GS alone.
170ER  G  3317
170ER CG           (|G{-|g0}){+2}/|G=11 meV if J=1 to GS transition; nominated
170ER2CG as a GS transition because a 79 KEV lower EG(=3237) line is also
170ER3CG present (1976ME04).
170ER  G  3564
170ER CG           (|G{-|g0}){+2}/|G=24 meV (1976ME04) if J=1 to GS transition.
170ER  G  3619
170ER CG           (|G{-|g0}){+2}/|G=90 meV if J=1 to GS transition; however,
170ER2CG probable doublet feeding 0 and 79 levels (1976ME04). Presumably
170ER3CG includes 3623 to GS and 3695 to 79 transitions reported in 1996MA18.
170ER  G  3704
170ER CG           (|G{-|g0}){+2}/|G=15 meV (1976ME04) if J=1 to GS transition.
170ER  G  3917
170ER CG           (|G{-|g0}){+2}/|G=25 meV (1976ME04) if J=1 to GS transition.
170ER  G  4013
170ER CG           (|G{-|g0}){+2}/|G=35 meV (1976ME04) if J=1 to GS transition.
170ER  L 0.0          0+                                                    A
170ER  L 78.6         2+                                                    A
170ER  L 1824          1 1-              5.7 FS    5          11.6      10B
170ER3 L FLAG=D
170ER CL           (|G{-|g0}){+2}/|G: weighted average of 11.4 meV 11 (1976ME04)
170ER2CL and 12.0 meV 19 (1996MA18).
170ER CL          K=0 (1996MA18).
170ER  G 1745         163     5
170ER CG E         from 1973ME17.
170ER CG           Branching: from weighted average of |G{-|g1}/|G{-|g0}=1.64 8
```

From Γ_1/Γ_0

```
170ER2CG (1996MA18), 1.63 7 (1976ME04)
170ER  G 1824        1 100        E1                                        B
170ER CG E          from 1991ZI01.
170ER  L 1973        2                                          0.6        5
170ER CL            (|G{-|g0}){+2}/|G: from 1976ME04, assuming J=1.
170ER  G 1973                                                               A
170ER  L 2039        2  1,2                0.10 PS    3                    1.2        3
170ER CL            ^T{-1/2} and (|G{-|g0}){+2}/|G: if J=1 (1976ME04).
170ER  G 1960           93      10
170ER CG            Branching: from adopted gammas.
170ER  G 2039           100     10
170ER  L 2133        2 1                   62 FS      9                    3.8        4
170ER CL            (|G{-|g0}){+2}/|G: weighted average of 3.7 meV 5 (1976ME04)
170ER2CL and 3.8 meV 5 (1996MA18).
170ER  G 2054           39      10
170ER CG            Branching: from |G{-|g1}/|G{-|g0} in 1976ME04.
170ER  G 2133           100        D
170ER  L 2685        2                                          0.1        9    ?
170ER CL            (|G{-|g0}){+2}/|G: assuming J=1 (1976ME04).
170ER  G 2685                                                               A  ?
170ER  L 2701        2 1                   23 FS      3                    9.1        12
170ER CL            (|G{-|g0}){+2}/|G: weighted average of 11.5 meV 22 (1976ME04)
170ER2CL and 8.5 meV 11 (1996MA18).
170ER CL            K=1 (1996MA18).
170ER  G 2622           48       6
170ER CG            Branching: from weighted average of |G{-|g1}/|G{-|g0}=0.48 7
170ER2CG (1996MA18), 0.49 13 (1976ME04).
```

From W(θ) and lin. pol.

```
170ER  G 2701          100        D
170ER  L 2751        2 (1)                0.15 PS   AP              3          1
170ER  G 2672            0     AP
170ER  G 2751          100     AP (D)
170ER  L 2789        2 1+                 7.7 FS    5               25.6       13
170ER CL            (|G{-|g0}){+2}/|G: weighted average of 24.4 meV 25 (1976ME04)
170ER2CL and 26.0 meV 15 (1996MA18).
170ER CL           K=(1) (1996MA18).
170ER  G 2710          52       5
170ER CG           Branching: from weighted average of |G{-|g1}/|G{-|g0}=0.59 6
170ER2CG (1996MA18), 0.49 4 (1976ME04).
170ER  G 2789          100        M1
```

^{58}Fe(p,p')

```
 59CO    58FE(P,P')                          1971LI14
 59CO  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 95,215 (2002)$CUT=8-Feb-2002$
 59CO C  Others: 1975BR29 (58FE(P,P'G)), 1972PE23.
 59CO C  1971LI14: EP=2.0-3.1 MEV, but data not analyzed beyond 2.65 MEV;
 59CO2C  measured SIGMA(EP,THETA), THETA=90 DEG, 120 DEG,
 59CO3C  135 DEG, and 160 DEG, beam resolution 300-400 EV.
 59CO C  See 1972PE23 for correlations between fine structure widths of 14
 59CO2C  59FE(GS) analog fragments in (P,P), (P,P') and (P,G), EP AP 2210-2300.
 59CO CL           Data are from 1971LI14. The fragmented analogs of
 59CO2CL 59FE(GS) (JPI=3/2-, 14 fragments) and 59FE(287) (JPI=1/2-, 10
 59CO3CL fragments) have their centroids at EP(lab)=2220 5 and 2512 5,
```

```
59CO4CL respectively. A third analog near EP=2.98 MEV was identified but not
59CO5CL analyzed. Since EP is well below the COULOMB barrier, only s-, p- and
59CO6CL d-wave resonances are expected.
59CO CL E          Calculated as EP(C.M.)+SP, assuming SP=7363.7 6 (1995AU04).
59CO CL J          From multilevel, multichannel R-matrix analysis of
59CO2CL SIGMA(EP,THETA).
59CO CL S          |G{-p0} in EV (1971LI14). |G{-p'}(811) was neglected in
59CO2CL analysis by 1971LI14 and, typically, WIDTHG<<|G{-p0} (see (P,G)), so
59CO3CL |G{-p0} AP WIDTH. See 1972PE23 for additional |G{-p0} and |G{-p1}
59CO4CL data.
59CO CL L          Laboratory proton energy of resonance (1971LI14); DE AP 3
59CO2CL KEV (absolute), 0.2 KEV (relative). EP from 1972PE23, 1975BR29 AP 5 KEV
59CO3CL higher.
59CO CL L$LABEL=EP(LAB)
59CO CL S$LABEL=|G{-p0} EV
59CO CL E(A)       Possible 59FE(GS) analog fragment (1971LI14). Analog energy
59CO2CL estimated to be 9545 5 (1971LI14).
59CO CL E(B)       Possible 59FE(287 level) analog fragment (1971LI14). Analog
59CO2CL energy estimated to be 9835 5 (1971LI14).
59CO  L 9465.3     30(3/2-)                                  2137.8  10          5A
59CO  L 9491.3     301/2+                                    2164.3  30         10
59CO  L 9513.7     30(3/2-)                                  2187.1  30         10A
59CO  L 9523.1     301/2+                                    2196.6  15          8
59CO  L 9525.4     301/2+                                    2199.0  15          8
59CO  L 9534.9     30(3/2-)                                  2208.6  30         10A
59CO  L 9538.3     30(3/2-)                                  2212.1  25         10A
```

↑ $S_p + E_{res}$(c.m.) $E_p$res (lab) ↑ ↑ Γ_{p0}

Lecture II. Adopted Levels, Gammas Dataset Examples:

(i) ^{59}Fe

```
59FE     ADOPTED LEVELS, GAMMAS
59FE  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 95,215 (2002)$CUT=8-Feb-2002$
59FE CL E          From least-squares adjustment of EG, excluding primary
59FE2CL transitions from (N,G). See (N,P) source dataset for energy
59FE3CL centroid for GAMOW-TELLER strength.
59FE CL T          From 48CA(15N,3NPG), (18O,3NAG) recoil distance or
59FE2CL DSA (1977WA10), except as noted.
59FE CG E,RI       FROM 58FE(N,G), (POL N,G) E=THERMAL, EXCEPT AS NOTED.
59FE CG M          From G(|q) in (18O,3NAG) or (15N,3NPG) and adopted DPI.
59FE CL T(A)       Weighted average of 44.472 D 8 (1997MA75), 44.507 D 7
59FE2CL (1992UN01 and 2002Un02 which supersede 1982HOZJ), 44.530 D 21
59FE3CL (1983WA26) and 44.496 D 7 (1980HO17). Others:
59FE4CL 1960SU10 (46.5 D 10), 1959PI43 (45.60 D 8), 1958KE26 (44.56 D 3),
59FE5CL 1960FU03, 1957WR37, 1956RU45, 1953TO17, 1951SC56.
59FE CG E(B),RI(B)$FROM 48CA(15N,3NPG), (18O,3NAG).
59FE CG E(DE),RI(D)$WEIGHTED AVERAGE FROM B- DECAY AND (N,G) E=THERMAL.
59FE  XA59MN B- DECAY
59FE  XB48CA(15N,3NPG), (18O,3NAG)
59FE  XC57FE(T,P)
59FE  XD58FE(N,G), (POL N,G) E=THERMAL
59FE  XE58FE(N,G) E=RES
59FE  XF58FE(D,P), (POL D,P)
```

```
59FE  XG58FE(D,PG)
59FE  XH60NI(14C,15O)
59FE  XI59CO(N,P)
59FE  Q 1565.2    6 6580.90 20 12045  30              1995AU04
59FE PN                                                                6
59FE  L 0.0          3/2-              44.495 D  9                      A
59FE2 L %B-=100$MOMM1=-0.3358 4$
59FEX L XREF=ABCDEFGH
59FE CL MOMM1      From |b-NMR on oriented nuclei (1996OH02).
59FE2CL Other: 0.29 3 from low-temperature nuclear orientation (1989RA17).
59FE CL J          3/2 from atomic beam (1965DO11); L(D,P)=1.
59FE  L 287.021   19 1/2-
59FEX L XREF=ACDEFG
59FE CL J          (POL D,P), L(D,P)=1.
59FE  G  287.03   2 100          [M1,E2]
59FE  L 472.74     8 5/2-
59FEX L XREF=ABCDEFG
59FE CL J          (POL D,P), L(D,P)=3.
59FE  G  472.71    8 100         (M1+E2)
59FE CG E          WEIGHTED AVERAGE FROM B- DECAY AND
59FE2CG 48CA(15N,3NPG), (18O,3NAG).
59FE CG            MR(^D,Q)=-0.02 4 or -3.8 6 from (18O,3NAG)
59FE  L 570.86    4 (5/2)-
59FEX L XREF=ABCDEFG
59FE CL J          L(T,P)=2 for 1/2- target; ^D+Q G from 7/2-. Conflicts
59FE2CL with L(D,P)=1, but |s(|q) poorly fitted in (D,P). Also inconsistent
59FE3CL with primary G from 1/2+ in (N,G) E=thermal,
```

```
59FE4CL but EG of primary is AP 2 KEV too high, so G may be misplaced.
59FE  G  570.81    5 100       (M1+E2)
59FE CG E          WEIGHTED AVERAGE FROM B- DECAY, (N,G) E=THERMAL AND
59FE2CG 48CA(15N,3NPG), (18O,3NAG).
59FE CG            MR(^D,Q)=+0.15 to +2.1 from (18O,3NAG).
59FE  L 613.04     16                                                    ?
59FEX L XREF=DF
59FE  G  613.1      3 100                                                ?
59FE  L 642.8       3                                                    ?
59FEX L XREF=DF
59FE  G 642.9      3 100                                                 ?
59FE  L 726.41     5 3/2-
59FEX L XREF=ACDEFGH
59FE CL J          (POL D,P), L(D,P)=1.
59FE  G 439.42     5 3.73    22                                       D
59FE  G 726.6      5 100                                              D
59FE  L 1023.14    10 7/2-
59FEX L XREF=ABCEF
59FE CL J          L(D,P)=3; L(T,P)=4 for 1/2- target.
59FE  G  452.31    11 73      5 (M1+E2)                               B
59FE CG            MR(^D,Q)=+0.19 to +2.0 from (18O,3NAG).
59FE  G  550.4        9       4                                       B
59FE  G  1023.07   17 100     5                                       B
59FE  L 1077.79    121/2-,3/2-
59FEX L XREF=ADF
59FE CL J          L(D,P)=1.
59FE  G  465.0     2 100
```

```
59FE  L 1162.08   4 3/2-
59FEX L XREF=ACDEF
59FE CL J         L(D,P)=1; J NE 1/2 from (POL N,G).
59FE  G  591.20   3 100      4
59FE  G  689.0    3 3.1      9                                          E
59FE  G  875.10   7 29.1     3                                          E
59FE  G  1162.17  8 14.7    12
59FE  L 1211.33   11 1/2-
59FEX L XREF=CDEFGH
59FE CL J         (POL D,P), L(D,P)=1.
59FE  G  1211.22  11 100
59FE  L 1517.23   179/2+              145 PS    25
59FEX L XREF=BCF
59FE CL J         L(D,P)=4; L(T,P)=5 for 1/2- target.
59FE  G  494.09   13100        (E1)                                     B
59FEB G BE1W=2.6E-5 4 $
59FE  L 1569.90   8 5/2-
59FEX L XREF=ACDF
59FE CL J         L(D,P)=3; L(T,P)=2 for 1/2- target. Inconsistent with
59FE2CL primary G from 1/2+ in (N,G) E=thermal, but EG of primary is 2 KEV too
59FE3CL low, so G may be misplaced.
59FE  G  1569.88  8 100
59FE  L 1648      105/2+
59FEX L XREF=CFH
59FE CL J         (POL D,P), L(D,P)=2.
59FE  L 1749.78   143/2-,5/2-
59FEX L XREF=ACDEF
```

```
59FE CL J          L(T,P)=2 for 1/2- target.
59FE  G  537.4     7 50       25
59FE  G  1749.5    3 100      13
59FE  L 1918.90    5 3/2,5/2+
59FEX L XREF=ACDEFH
59FE CL J          J NE 1/2 from (POL N,G); primary G from 1/2+ in
59FE2CL (N,G) E=thermal.
59FE  G  756.92    124.4      5
59FE  G  841.24    1213.5     11
59FE  G  1192.50   5 12.8     7
59FE  G  1918.71   8 100      3
59FE  L 1961.96    6 1/2-
59FEX L XREF=ACDEF
59FE CL J          L(T,P)=0 for 1/2- target.
59FE  G  1235.54   4 100      4
59FE  G  1348.4    3 10       3
59FE  G  1961.92   1836       8
59FE  L 2161.9     9 1/2,3/2,5/2+
59FEX L XREF=DF
59FE CL J          primary G from 1/2+ in (N,G) E=thermal.
59FE  G 1548.8     8 100
59FE  L 2277.9     4
59FEX L XREF=DF
59FE  G  1551.7    10100      50
59FE  G  2279.3    8 83       33
59FE  L 2312.24    22 13/2+             4.7 PS     6
59FEX L XREF=B
```

```
59FE CL J          stretched E2 G to 9/2+ in (18O,3NAG).
59FE  G  795.00    15100          E2                                    B
59FEB G BE2W=28 4 $
59FE  L 2322.4      6 1/2,3/2,5/2+
59FEX L XREF=DF
59FE CL J          primary G from 1/2+ in (N,G) E=thermal.
59FE  G  2322.4    6 100
59FE  L 2348.2     4  (1/2,3/2,5/2-)
59FEX L XREF=D
59FE CL E          Must differ from (7/2)- level excited in (D,P); otherwise,
59FE2CL mult(1137G) to 1/2- would be M3 and transition could not compete
59FE3CL with the [E2] 2349G observed in B- decay.
59FE CL J          G to 1/2-.
59FE  G  1136.9    3  100
59FE  L 2349.0     9 (7/2)-
59FEX L XREF=AF
59FE CL J          L(D,P)=3, (POL D,P) for E=2345 10 level. See comment on
59FE2CL 2348 level.
59FE  G  2348.9    9  100
59FE CG E          FROM 59MN B- DECAY.
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(ii) ^{170}Tm

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170TM    ADOPTED LEVELS, GAMMAS
170TM  H TYP=FUL$AUT=CORAL M. BAGLIN$CIT=NDS 96,611 (2002)$CUT=15-Aug-2002$
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170TM CG E,RI,M,MR$Data are from (N,G) E=0-136 EV, unless noted
170TM2CG otherwise.
170TM CG E(YZ),RI(Y)$From (N,G) E=thermal: G coin. Uncertainty in EG may be
170TM2CG underestimated.
170TM CL            For neutron resonance parameters and thermal cross sections
170TM2CL see 1984MUZY.
170TM CL            For nuclear band configurations see 1981DE29 and 1996HO12.
170TM CL E          From least-squares adjustment of EG from (N,G) E=0-136 EV
170TM2CL whenever G deexcitation of level has been observed in that reaction.
170TM2CL For levels reported only in (N,G) E=thermal: G coin, authors'
170TM4CL E(level) values are adopted.
170TM CL BAND(B)    KPI=1- GS BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 1/2[521]).
170TM3CL Rotational parameters: A=11.4 (for J odd), 10.3 (for J even).
170TM CL BAND(A)    KPI=(0)- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 1/2[521]). Rotational parameters:
170TM3CL A=11.67 (for J even), 11.25 (for J odd); Newby shift is +32 KEV
170TM4CL (1996HO12).
170TM CL BAND(C)    KPI=(1)- BAND.
170TM2CL Configuration=(|p 3/2[411])-(|n 1/2[521]) plus (|p 7/2[404])-(|n
170TM3CL 5/2[512]). Rotational parameter: A=11.8 (for J odd).
170TM CL BAND(D)    KPI=(3)- BAND.
170TM2CL Configuration=(|p 1/2[541])-(|n 7/2[633]) from (n,|g); rotational
170TM3CL parameter: A=5.1.
170TM CL BAND(E)    KPI=(2)- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 5/2[512]). Rotational parameter:
170TM3CL A=11.0. Band is anomalously populated in (T,A).
```

```
170TM CL BAND(H)   KPI=(0)+ BAND.
170TM2CL Configuration=(|p 7/2[404])-(|n 7/2[633]). Rotational parameter: A=7.2
170TM3CL (J=even); +36 KEV Newby shift.
170TM CL BAND(I)   KPI=(2)- BAND.
170TM2CL Configuration=(|p 5/2[413])-(|n 1/2[521]). Rotational parameter:
170TM3CL A=11.0.
170TM CL BAND(J)   KPI=(3)- band.
170TM2CL Configuration=(|p 1/2[411])+(|n 5/2[512]). Band is anomalously
170TM3CL populated in (T,A). Rotational parameter: A=11.58.
170TM CL BAND(K)   KPI=(3)- BAND.
170TM2CL Configuration=(|p 7/2[404])-(|n 1/2[521]).
170TM CL BAND(L)   KPI=(3-) BAND.
170TM2CL Configuration=(|p 5/2[402])+(|n 1/2[521]) suggested in (T,A), but
170TM3CL level's excitation is stronger than expected for this configuration.
170TM CL BAND(M)   KPI=(3)+ BAND.
170TM2CL Configuration=(|p 7/2[523])-(|n 1/2[521]). Rotational parameter:
170TM3CL A=10.0.
170TM CL BAND(N)   KPI=(3)- band.
170TM2CL Configuration=(|p 5/2[413])+(|n 1/2[521]). Rotational parameter:
170TM3CL A=9.75.
170TM CL BAND(O)   KPI=(1)- band.
170TM2CL Configuration=(|p 3/2[411])-(|n 5/2[512]) plus (|p 1/2[411])+(|n
170TM3CL 1/2[510]) plus ((|p 1/2[411])-(|n 5/2[512])-|g vibration).
170TM4CL Rotational parameter: A=11.3.
170TM CL BAND(P)   KPI=(4)+ BAND.
170TM2CL Configuration=(|p 7/2[523])+(|n 1/2[521]). Rotational parameter: A=9.9.
170TM CL BAND(Q)   KPI=(1)+ BAND.
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170TM2CL Configuration=(|p 1/2[541])+(|n 1/2[521]). Coriolis-mixed band.
170TM CL BAND(S)   KPI=(0)+ BAND.
170TM2CL Configuration=(|p 1/2[541])-(|n 1/2[521]). Coriolis-mixed band.
170TM3CL -44 KEV Newby SHIFT.
170TM CL BAND(T)   KPI=(1)- BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 3/2[521]) plus (|p 7/2[404])-(|n
170TM3CL 5/2[512]) plus (|p 3/2[411])-(|n 1/2[521]).
170TM4CL Rotational parameter: A=10.1 (for J=odd).
170TM CL BAND(U)   KPI=(2)- BAND.
170TM2CL Configuration=(|p 1/2[411])+(|n 3/2[521]) plus (|p 3/2[411])+(|n
170TM3CL 1/2[521]) plus ((|p 1/2[411])+(|n 1/2[521])-|g vibration).
170TM3CL Rotational parameter: A=11.4 (for J=even).
170TM CL BAND(V)   KPI=(0)- BAND.
170TM2CL Configuration=(|p 7/2[523])-(|n 7/2[633]). Rotational parameter: A=8.4
170TM3CL (even J), 8.2 (odd J); band exhibits Newby shift of +41 KEV (1996HO12).
170TM CL BAND(Y)   KPI=(1)- BAND. GAMMA-VIBRATION
170TM2CL built on K|p=1- g.s. band. Rotational parameter: A=10.1.
170TM CL BAND(Z)   KPI=(3)+ BAND.
170TM2CL Configuration=(|p 1/2[411])-(|n 7/2[633]). Rotational parameter: A=8.0.
170TM CL BAND(a)   KPI=(1)+ BAND.
170TM2CL Configuration=(|p 7/2[523])-(|n 5/2[512]). Rotational parameter:
170TM3CL A=10.4.
170TM CL BAND(b)   KPI=(4)+ band.
170TM2CL Configuration=(|p 1/2[411])+(|n 7/2[633]). Rotational parameter: A=8.5.
170TM CL E(c)      Configuration=(|p 3/2[411])+(|n 1/2[521]) was suggested
170TM2CL in (T,A).
170TM CL J(d)      L(T,A)=2 for E=716 4 level, with J=2 favored by |s(|q) and
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170TM2CL possible configuration=((|p 5/2[402])-(|n 1/2[521])).
170TM3CL However, if J LE 2, level should have been populated in (N,G) E=2,
170TM4CL 24 KEV and it was not, so J=3 seems more likely. 1996HO12 suggest
170TM5CL that this level is the J=3 member of the (|p 3/2[411])-(|n 1/2[521])
170TM6CL band; its energy is a little high for that, however.
170TM CL J(R)      Based on (N,G) E=res primary-transition intensities to
170TM2CL state from various 1+ and/or 0+ resonances for which E(n) LE 136 EV,
170TM3CL assuming mult=E1 for primary G.
170TM CL E(W)      From (N,G) E=2, 24 KEV.
170TM CL J(X)      PI from L transfer; J from L and/or |s(|q)
170TM2CL in (T,A) and plausible band structure.
170TM PN                                                                  6
170TM  Q 968.0     8 6593.3  116162.1  14850.8   16    1995AU04
170TM  XA169TM(N,G) E=0-136 EV
170TM  XB171YB(T,A)
170TM  XC170TM(D,D')
170TM  XD169TM(D,P)
170TM  XFCOULOMB EXCITATION
170TM  XG170ER(3HE,T)
170TM  XH169TM(N,G) E=2, 24 KEV
170TM  XI169TM(N,G) E=THERMAL: G COIN
170TM  L 0.0          1-              128.6 D   3                       B
170TM2 L XREF=ABCDFHI
170TM CL J         J=1 from atomic beam magnetic resonance (1976FU06);
170TM2CL L(D,P)=1.
170TM CL T         from 1968RE04. Others: 125 D 2 (1962BO12),
170TM2CL 134.2 D 8 (1965FL02), 128 D 1 (1967KE13), 127.1 D 9
```

```
170TM3CL (1969LA34).
170TM4 L MOMM1=+0.2468 12
170TM5 L MOME2=+0.74 2
170TM6 L %EC=0.131 10$  %B-=99.869 10
170TM CL %EC,%B-   see 170TM EC decay.
170TM CL MOMM1     weighted average of 0.2476 16 (1990SH18, |b radiation
170TM2CL detected optical pumping) and +0.2458 17 (1988DY02, atomic beam
170TM3CL resonance fluorescence). Other: +0.248 4 (1989RA17).
170TM CL MOME2     from resonance ionization mass spectroscopy (1989RA17,
170TM2CL from 1988AL04, 1987MI31). Others: 0.72 5 (1988DY02, atomic beam
170TM3CL resonance fluorescence).
170TM  L  38.7139   5(2)-              1.71 NS   17                          B
170TM2 L XREF=ABCDFHI
170TM CL J         L(D,P)=1; GS band member.
170TM CL T         from B(E2)=3.2 3 in Coulomb excitation.
170TM  G 38.714    1 100        E2                      197
170TMB G BE2W=343 35
170TM CG           BE2W: from measured BE2.
170TM  L 114.5440   6 (3)-             0.60 NS   3                           B
170TM2 L XREF=ABCDFI
170TM CL J         E2 G to 1-; L(D,P)=3; band assignment.
170TM CL T         from BE2=2.38 10 in Coulomb excitation and adopted
170TM2CL branching.
170TM  G 75.831    1 20.2    17M1+E2      0.85   5     7.97   7
170TMB G BM1W=0.00211 19$BE2W=122 12
170TM  G 114.544   1 100.0    4 E2                    1.87
170TMB G BE2W=182 8
```

```
170TM CG           BE2W: from measured BE2.
170TM  L 149.7180   6(0)-                                                A
170TM2 L XREF=ABDHI
170TM CL J         M1 149G to 1- g.s.; J=0 from
170TM2CL |s(|q) and expected band structure in (T,A).
170TM  G 111.005   1  5.48   25 E2                      2.10
170TM  G 149.718   1  100     8 M1                      1.01
170TM  L 183.1897  14(4)-                                               B
170TM2 L XREF=ABCDF$
170TM CL J         L(D,P)=3; J=4 from
170TM2CL |s(|q) and expected band structure in (T,A).
170TM  G 68.6491      0.9     4 E2                      13.9              @
170TM  G 144.480      100    12 E2                      0.804             @
170TM CG E         144.480 1 for doublet.
170TM  L  183.197   4(3)+              4.12 US   13                      Z
170TM2 L XREF=AI
170TM CL J         E1 gammas to (3)- 115 and (2)- 39;
170TM2CL band assignment in (N,G) E=0-136 EV.
170TM CL T         from G(t) and pulsed beam technique in (N,G), (D,PG).
170TM  G 68.6491   4  41.6   20 E1                       0.90              @
170TMB G BE1W=3.6E-8 3
170TM  G 144.4797  5  100     6 E1                      0.127             @
170TMB G BE1W=0.93E-8 8
170TM CG E         144.4797 5 for doublet.
170TM  L  204.4486  7 (2)-              1 NS    LT                       E
170TM2 L XREF=AB(194)DHI
170TM CL J         M1 gammas to 1- g.s. and (3)- 115.
```

```
170TM CL T          from |g(t) measurement in (N,G) E=0-136 eV.
170TM  G 89.906     3  0.85     9 M1                          4.32
170TM  G 165.735    1  43.6    24M1(+E2)     0.7    LE       0.71 5
170TM  G 204.448    1  100.0     6 M1                        0.421
170TM  L  219.7060  6 (2)-                0.25 NS  3                        A
170TM2 L XREF=ABCDFHI
170TM CL J          220G to 1- g.s. and 105G to (3)- 115 are M1+E2.
170TM CL T          from BE2=0.085 10 in Coulomb excitation and adopted MR and
170TM2CL branching.
170TM  G 69.988     1  4.2      6 E2                          12.9
170TMB G BE2W=240 50
170TM  G 105.162    1  28.6     3M1+E2       0.4    3        2.72 3
170TMB G BM1W=0.0045 11$BE2W=30 +40-30
170TM  G 180.994    1  100      9 M1+E2     0.28    3     0.575  4
170TMB G BM1W=0.0033 6$BE2W=3.6 10
170TM  G 219.705     1 77.2     6 M1+E2     1.29    10    0.250  6
170TMB G BM1W=0.00058 10$BE2W=9.1 11
170TM CG            BE2W: from measured BE2.
170TM  L  237.2396  6(1)-                                         A
170TM2 L XREF=ABDHI
170TM CL J          88G to (0)- 150 is M1.
170TM  G 17.554      8 0.294  25 (M1(+E2))0.24    LE
170TM CG            CC(M1)=88, CC(E2)=10090.
170TM  G 87.521      1 31.6    7 M1                      4.66
170TM  G 198.524     1 13.9    4 M1                      0.457
170TM  G 237.241     1 100.0  20 M1                      0.280
170TM  L 247.147     6 (4)+                                        Z
```

```
170TMX L XREF=AD
170TM CL J         M1+E2 G to (3)+; E1 G to (4)-; band assignment.
170TM  G 63.959    4 100     13M1+E2      0.65          13.7                    @
170TM3 G FL=183.197
170TM  G 63.960    4 15.3    23E1                       1.08                    @
170TM3 G FL=183.1897
170TM  L  270.5466  8(3)-                                                       E
170TM2 L XREF=ABDI
170TM CL J         M1 G to (2)- 38; M1+E2 G to (3)- 115; J=3 from
170TM2CL |s(|q) and expected band structure in (T,A).
170TM  G 66.098    1  99     10 M1(+E2)   0.33   LE    10.8   3
170TM  G 87.5
170TML G FL=183.1897
170TM  G 156.003   1  29.6   23 M1+E2     0.32   7     0.87   1
170TM  G 231.834   2  100     6 M1                     0.298
170TM  L 319.3260  12(5)-                                                      B
170TM2 L XREF=ABCDF
170TM CL J         E2 205G to (3)- 115;
170TM2CL J=5 from |s(|q) and expected band structure in (T,A).
170TM  G 204.782    1 100        E2                     0.242
170TM  L 327.1      7 (5+)                                                      Z
170TM2 L XREF=BD
170TM CL J         band assignment in (D,P).
170TM  L  349.7330  8(3)-                                                       A
170TM2 L XREF=ABDI
170TM CL J         M1 G to (3)- 115; M1(+E2) G to (2)- 38; J=3 from
170TM2CL |s(|q) and expected band structure in (T,A).
```

```
170TM  G 112.494    2 1.64   15 E2                      2.00
170TM  G 130.027    1 50.7   15  M1+E2    0.55   9     1.42   2
170TM  G 145
170TM  G 235.193    2 46.9   12 M1                      0.286
170TM  G 311.018    2 100    4  M1(+E2)   0.23   LE    0.133  2
170TM  L 355.047    6 (4)+                                                b
170TMX L XREF=A
170TM CL J         M1+E2 G to (4)+; M1(+E2) G to (3)+; possible
170TM2CL configuration=(|p 1/2[411])+(|n 7/2[633]) bandhead from (N,G) E=0-136
170TM3CL eV.
170TM  G 107.901   2 14.1    11 E2+M1    1.3     +3-4  2.42   3
170TM  G 171.855   1 21       3E1                      0.0802               @
170TM3 G FL=183.1897
170TM  G 171.855   1 100     11M1(+E2)    0.20         0.674                @
170TM3 G FL=183.197
170TM  L  358.1163  9(4)-                                                 E
170TM2 L XREF=AD
170TM CL J         M1+E2 |g's to (4)- and (3)-; band assignment.
170TM  G 87.571     2 100     3 M1+E2     0.27         5.17
170TM  G 153.667    1 46      4  E2                     0.64
170TM CG M         E2(+M1) from (N,G) E=0-136 eV; M1 component inconsistent
170TM2CG with placement.
170TM  G 174.927    2 12.8   14 M1+E2                   0.53   12
170TM  G 243.573    3 16.4   23 M1+E2     0.9    +4-3
170TM  L 381.4258  8 (4)-                                                  A
170TM2 L XREF=ABCD
170TM CL J         E2 G to (2)-; M1+E2 G to (4)-;
```

```
170TM2CL |s(|q) and expected band structure in (T,A).
170TM  G 31.713     9 5.7     4 (M1(+E2))0.87    LT
170TM CG           |a(M1)=15.1, |a(E2)=529.
170TM  G 161.721   1  100     5 E2                      0.54
170TM CG M,MR      E2(+M1), MR GE 2.2 from (N,G) consistent with pure E2
170TM2CG as required by placement.
170TM  G 198.237    2 31.1   18E2+M1      1.23   +25-190.34    2
170TM3 G FL=183.1897
170TM  G 266.881    1 57      6M1+E2     0.9     3     0.158  19
170TM  G 342.711   4  46.5   22 E2                     0.0485
170TM  L 402.7281  19 (3,4)-
170TMX L XREF=A
170TM CL J         M1+E2 G to (3)-; not fed by primary in (N,G) E=2, 24 keV.
170TM  G 288.185    2 100     8 M1+E2    0.64    20    0.141  11
170TM  G 364.012   4  14.7   11
170TM  L 409.4     8 (6-)                                                  B
170TM2 L XREF=CD
170TM CL J         |s(|q) in (D,D') and E(level) are consistent with
170TM2CL expectations for J=6 member of GS band.
170TM  L 419.2     5
170TM2 L XREF=BD
170TM  L 426.5      3 (6+)                                                 Z
170TMX L XREF=D
170TM CL J         band assignment in (D,P).
170TM  L 439.8      4 (5+)                                                 b
170TMX L XREF=D
170TM CL J         band assignment in (D,P).
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```
170TM  L  447.0707  8(3)-                                                  J
170TM2 L XREF=ABDI
170TM CL J         M1(+E2) 242G to (2)- 204; M1 89G to (4)- 358.
170TM  G 88.954     1 3.8     8 M1                    4.45
170TM  G 176.525    1 32.3   10 M1+E2     0.65   12   0.56   2
170TM  G 242.623    1 100.0  18 M1(+E2)   0.30   +15-300.25   1
170TM  G 263.877    5 1.76   11
170TM3 G FL=183.1897
170TM  G 332.522    5 3.85   11 M1(+E2)   0.60   LE   0.105  8
170TM  G 408.348   3  15.71  22 M1+E2     0.47   13   0.059  3
170TM  L 456.8      8
170TMX L XREF=D
170TM  L 467.8607  12 (5)-                                                 E
170TM2 L XREF=AD
170TM CL J         E2 197G to (3)- 270; band assignment.
170TM  G 109.744   3 75      14
170TM  G 197.314   1 100     11 E2                   0.274
170TM  L 476.9      5
170TMX L XREF=D
170TM  L 539.7223  17 (4)-                                                 J
170TM2 L XREF=AD
170TM CL J         M1+E2 G to (3)- 270; band assignment.
170TM  G 92.654     3 100     7 M1+E2     0.23   3     3.97
170TM  G 269.173    2 86     11M1+E2     1.0    4     0.149  23
170TM  G 335.274    8 16.4   27
170TM  L 544.050    8 (3+)
170TMX L XREF=AD(545.05)
```

```
170TM CL J          absence of state in (N,G) E=2, 24 KEV suggests
170TM2CL J>2; DPI=no 667G from level for which (N,G) E=2, 24 KEV implies
170TM3CL PI=+. However, placement of M1+E2 544G to 1- is inconsistent with
170TM4CL this.
170TM  G 505.344   15 100      7
170TM  G 544.043   11  57      3
170TM CG M,MR      E2+M1 (MR=1.0 +4-3) from EKC is inconsistent with
170TM2CG placement; either G is misplaced or mult is incorrect.
170TM  L 550.7473  17 (5)-                                                A
170TMX L XREF=ABD
170TM CL J         M1 G to (4)-; |s(|q) and expected band structure in (T,A).
170TM  G 169.321   2  26       4M1+E2     0.7     +4-3  0.63   7
170TM  G 192.633   3  19.0    12M1                     0.497
170TM  G 231.418   6  11.9    12
170TM  G 367.556   4  100      5 M1+E2    0.34    +16-250.082  5
170TM3 G FL=183.1897
170TM  L 590.2286  17  (1)-                                               C
---------
170TM  L 15492      7 0+               104 KEV   8
170TMX L XREF=G
170TM CL J         ^IAS of 170ER GS.
```