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Conversion coefficient for transitions with an E0 component

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Mixed electric monopole E0 transitions

- Electric monopole, E0 transitions are unique to nuclei: 0^+ to 0^+ transitions - a sensitive indicator of structure
- Mixed E0 transitions, between two states with the same spin and parity can be expected: mostly M1+E2+E0 transitions from 2^+ to 2^+
- Guidelines by Murray J. Martine (4/26/2021): calculate monopole strength, $\rho^2(E0)$, and some other details
- "E0 transition probabilities for 0^+ to 0^+ transitions" – a 4-page document by R. B. Firestone, August 24, 1987
- "Electric monopole transitions in nuclei" (2022Ki03)
- "Table of electronic factors for E0 electron and electron–positron pair conversion transitions" (2020Do01)

M1+E2+E0 transitions

- Conversion Coefficient (CC) of mixed M1+E2+E0 gamma in the ENSDF database:
  - About 80 transitions in the decay data sets
  - In “Electric monopole transitions in nuclei” review by T. Kibédi (2022Ki03):
    95 M1+E2+E0 gamma transitions are listed

- Current BrIcc (v2.3e) does not calculate the CC for a E0 mixed transition
- Estimated CC values are mostly listed in the ENSDF, for a few cases exp_α(K) values are available, however, no estimated value was given
- In some case, incorrect values are listed, most likely due to the BrIcc output

M1+E2+E0 transitions

- M1+E2+E0 gamma transitions in the ENSDF database:

^{178}Ta ε decay (9.31 min) 1974Ha63,1972Li03,1972Si26 (continued)

$\gamma(^{178}\text{Hf})$ (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ	α[b]	$I_{(\gamma+ce)}$[a]	Comments
1350.55 *9*	245 *6*	1443.83	0^+	93.14	2^+	E2		0.00229		Mult.: from α(K)exp=0.00191 *11* (1974Ha63), $\gamma\gamma(\theta)$ in 1972Li03.
1402.87 *9*	100	1496.01	2^+	93.14	2^+	E2+M1+E0	−0.73 *5*	0.00315 *7*		Mult.: from α(K)exp=0.0076 *4* and α(K)/α(L)=7.1 *7* (1974Ha63). α(K)/α(L)=6.6 *9* (1972Gi05),α(K/L)=6.7 *+14−10* (1971Oh03). Also $\gamma\gamma(\theta)$ in 1972Li03. δ: from $\gamma\gamma(\theta)$ (1972Li03).

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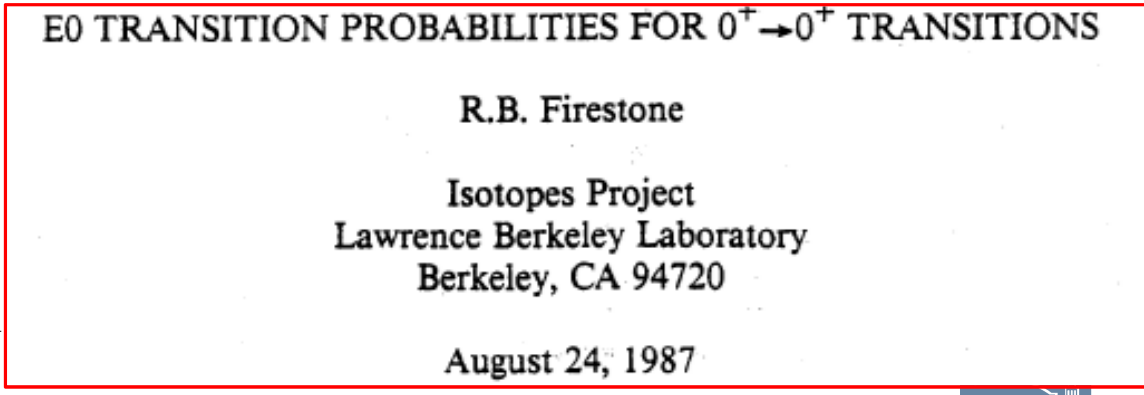
δ: from $\gamma\gamma(\theta)$ (1972Li03).

Outlook

- For the CC of M1+E2+E0 gamma in the ENSDF database:
  - We can collect all data from Dr. T. Kibédi and update the ENSDF
  - If mixing ratio missing – the code may not get the value – if exp_α(K) available – estimated value multiplying by **1.3** may be given.
  - During the evaluation collect and include – attention needed after running BrIcc
  - Jun may wish to add flags in his consistency ck code output
  - A document by Firestone on E0



E0 TRANSITION PROBABILITIES FOR $0^+ \rightarrow 0^+$ TRANSITIONS

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