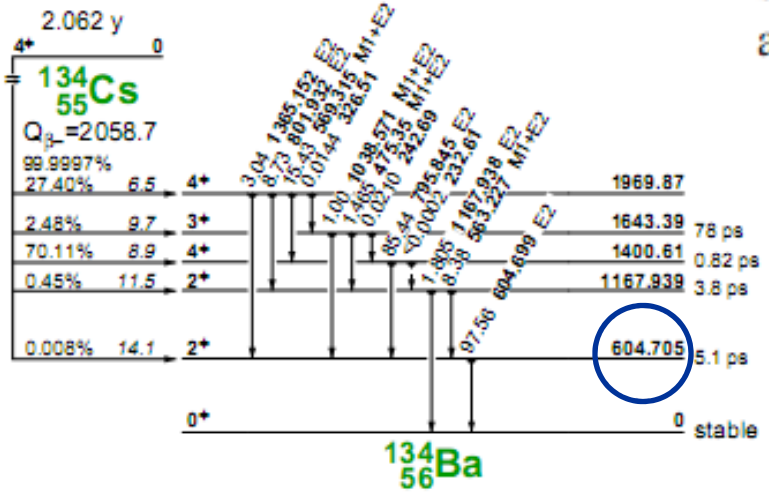
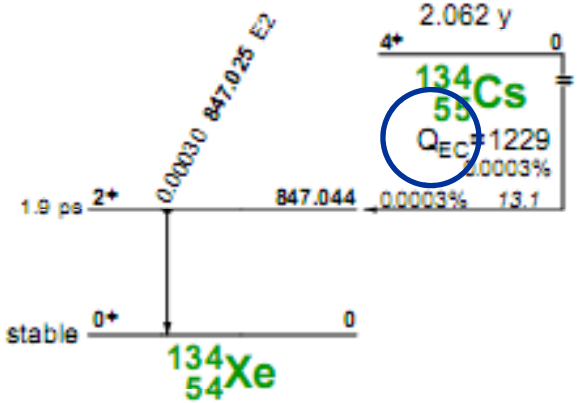
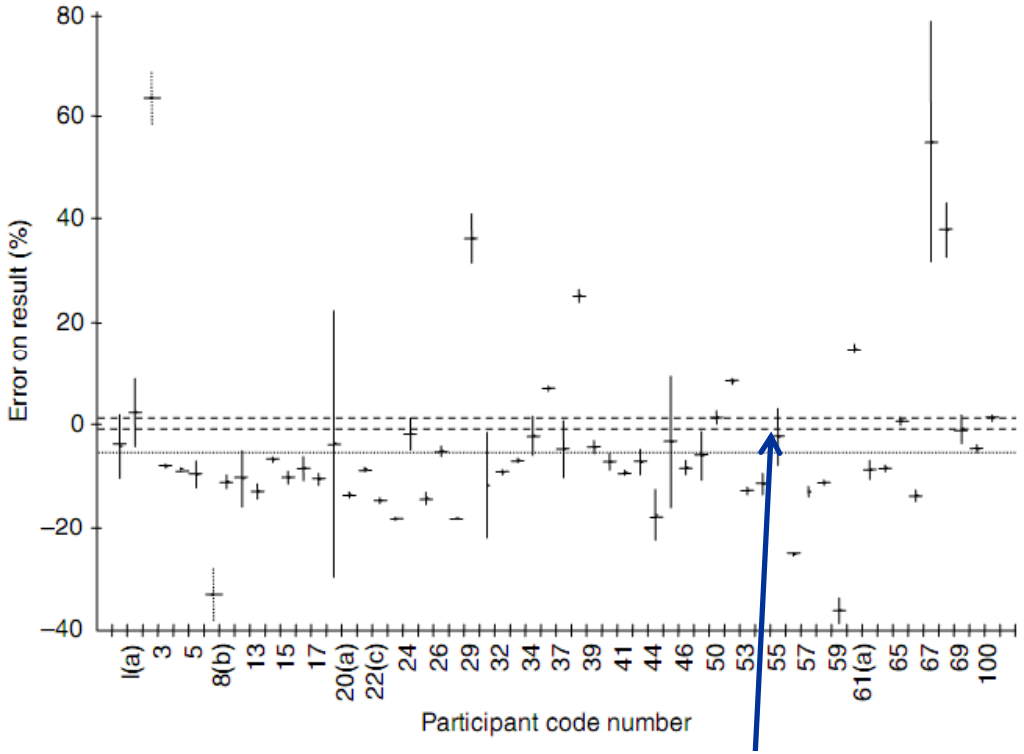
More on Coincidence Summing

^{134}Cs from Chernobyl





The message of this is obvious. True coincidence summing must be taken into account if accurate results are to be achieved.



sample was compared directly with a calibrated source of ^{134}Cs measured in the same geometry at the same distance

Good data acquired comparatively.

Can we always do that?

More on Coincidence Summing

Mathematical correction

- Assume IC coefficient = 0.
- Number of counts lost per second from the γ_1 peak:

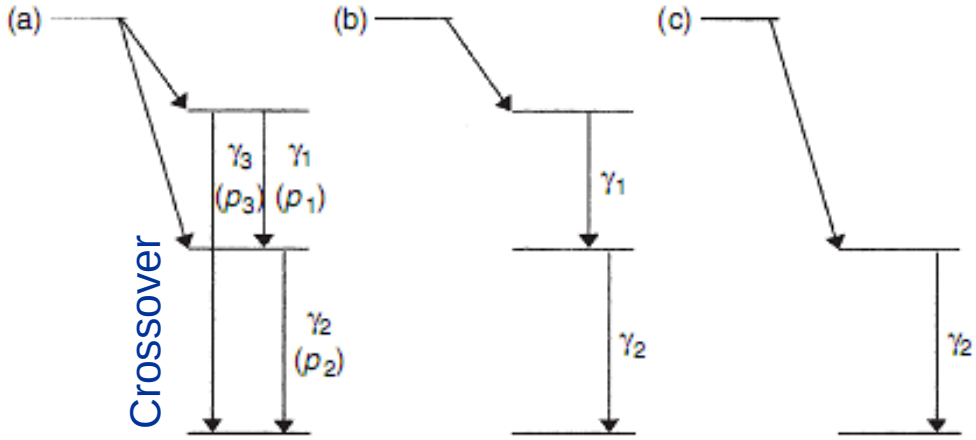
$$Ap_1\varepsilon_1\varepsilon_{T2}$$

- γ_3 does not contribute to these losses.

$$N_1^{\setminus} = Ap_1\varepsilon_1 - Ap_1\varepsilon_1\varepsilon_{T2}$$

$$\frac{N_1}{N_1^{\setminus}} = \frac{1}{1-\varepsilon_{T2}}$$

$$A = \frac{N_1}{p_1\varepsilon_1} = \frac{N_1^{\setminus}}{p_1\varepsilon_1(1-\varepsilon_{T2})}$$



$$N_2^{\setminus} = Ap_2\varepsilon_2 - Ap_1\varepsilon_2\varepsilon_{T1}$$

$$N_3^{\setminus} = Ap_3\varepsilon_3 \oplus Ap_1\varepsilon_1\varepsilon_2$$

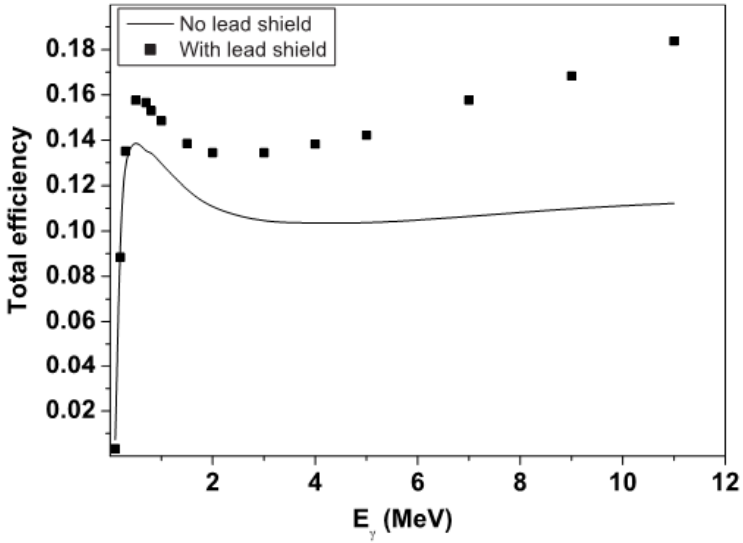
Summing-in.

More on Coincidence Summing

- IC not zero?
- Much more complicated decay schemes?
- β^+: Annihilation and coincidence with 511's.
- EC: γ-x coincidences.
- β^-: Coincidence with Bremsstrahlung.

Self absorption

- **Total efficiency????**
  - Availability of monoenergetic sources?
  - Depends on surrounding material.
    - Scattering.
    - X-rays.
    - 511's.
    - …



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HW 3

Discuss how MC can be used to find k_s.