Investigation of the double beta decay of ^{76}Ge into excited states of ^{76}Se in GERDA

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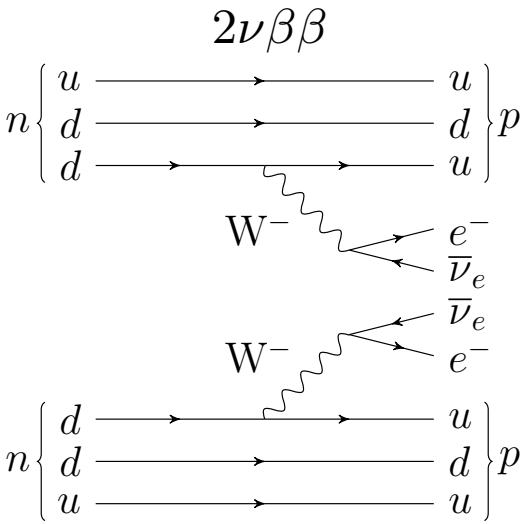
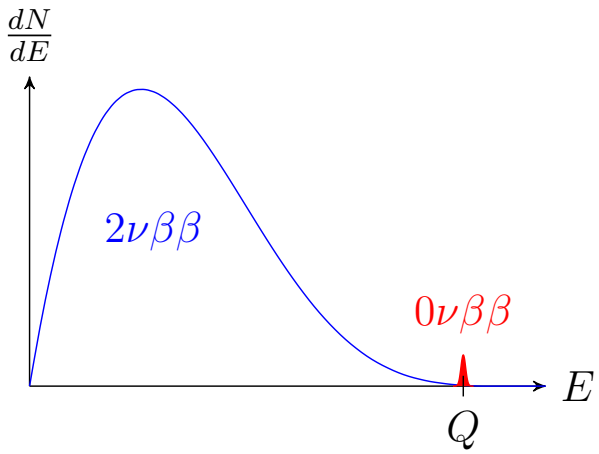
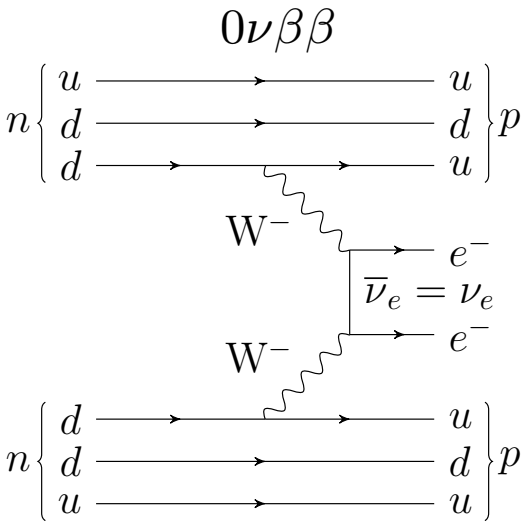
Double beta decay

- 2νββ allowed in SM, only observable when β decay strongly suppressed
- If $\nu = \overline{\nu} \rightarrow 0\nu\beta\beta$ possible, violates lepton number ($\Delta L = 2$)
  - Can be explained by light Majorana neutrinos (or other lepton number violating processes)
  - Constraints on effective Majorana neutrino mass







$$\left(T^{2\nu}_{1/2}\right)^{-1} \sim G^{2\nu} \cdot \left|\mathcal{M}^{2\nu}\right|^2$$

$$\left(T^{0\nu}_{1/2}\right)^{-1} \sim G^{0\nu} \cdot \left|\mathcal{M}^{0\nu}\right|^2 \cdot |m_{ee}|^2$$

- NME $\mathcal{M}$ is different for 0νββ and 2νββ, but relies on same model assumptions

MC signal signature for 2νββ of ^{76}Ge into excited states

- Investigation of 3 decay modes of ^{76}Ge into e.s.
- Search for multiplicity 2 events within GERDA
- Efficiency and background expectation are calculated with MC simulations