

## Previous lecture

- neutrino properties
  - ▶ lepton number

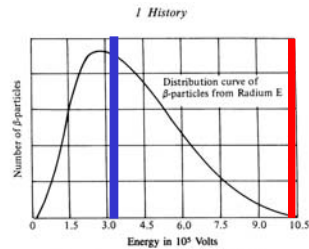


Fig. 1 Continuous beta spectrum of RaE.

- ▶ Neutrino existence

## Lecture Content

- Approx. lecture content
  1. PP intro
  2. PP intro.
  3. v props 1: strong/e.m./weak, no. neutrino generations
  4. v props 2: lepton no., v existence
    - Examples of decay/production
  5. Neutrino mass
    - Fermi-Kurie plot
    - Phase space kinematics/4-momentum
  6. Parity and CP violation... (why so important in lepton sector?)
    - Wu et al., <sup>60</sup>Co experiment
  7. Detection & observation
    - Liquid, solid, bubble chamber
    - "Direct" methods (DONUT)
  8. Solar and atmospheric neutrinos
    - Puzzle: relative abundances != SSM prediction
    - Two-flavour neutrino oscillation formalism
  9. Neutrino oscillations and mixing
    - Possible solutions to solar/atm. v problems
  10. Current and future experiments
    - SK, SNO, KAMLAND, CHOOZ
    - MINOS, miniBOONE, ...
    - NDBD (NEMO, etc.)
    - JPARC, vF,
  11. Implications for cosmology
    - Open vs. closed scenarios. various m, regions
    - v as DM candidate?
    - Subject outlook (JPARC, MICE, Neutrino Factory, ...)

## Today

- neutrino properties (continued)
  - ▶ 4-momentum, kinematics
  - ▶ neutrino mass

See also

Burcham&Jobes: Sect. 3.9

Burcham&Jobes: pp. 165-167 (assumes  $m_\nu=0$ )

Winter: pp. 9-11, 127-131 (assumes  $m_\nu \neq 0$ )

Perkins (2<sup>nd</sup> Ed.): pp. 220-226

## Fermi-Kurie plot

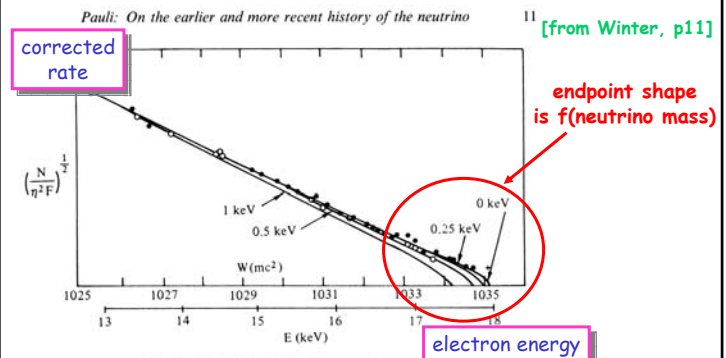
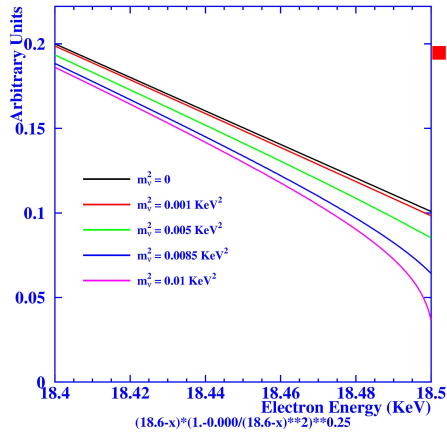


Fig. 2 Kurie plot of the tritium spectrum.

- Rate, corrected to account for Coulomb effects within nucleus
- See e.g. Burcham, 10.2.3; Burcham and Jobes, 5.2.3

# Fermi-Kurie plot

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■ Numerical example of shape of endpoint on neutrino mass (as function of electron energy)