β-Spectrometer

TP-IVa

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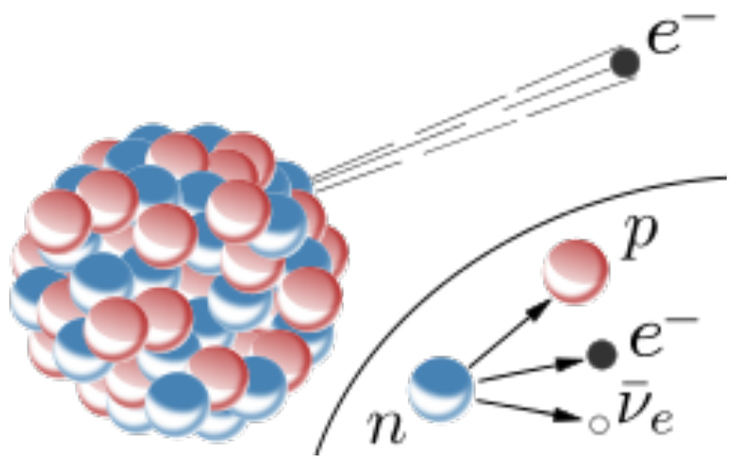
β-Spectrometer

- **Spectrometer:** machine to measure the spectrum of particles emitted by a system, to get information about the physical system and its components

- **β-decay:** weak decay that involves the emission of a **β** particle (e^+,e^-) and the corresponding neutrino/antineutrino

  - $n \rightarrow p + e^- + \bar{\nu}_e$

  - $p_{bound} \rightarrow n + e^+ + \nu_e$

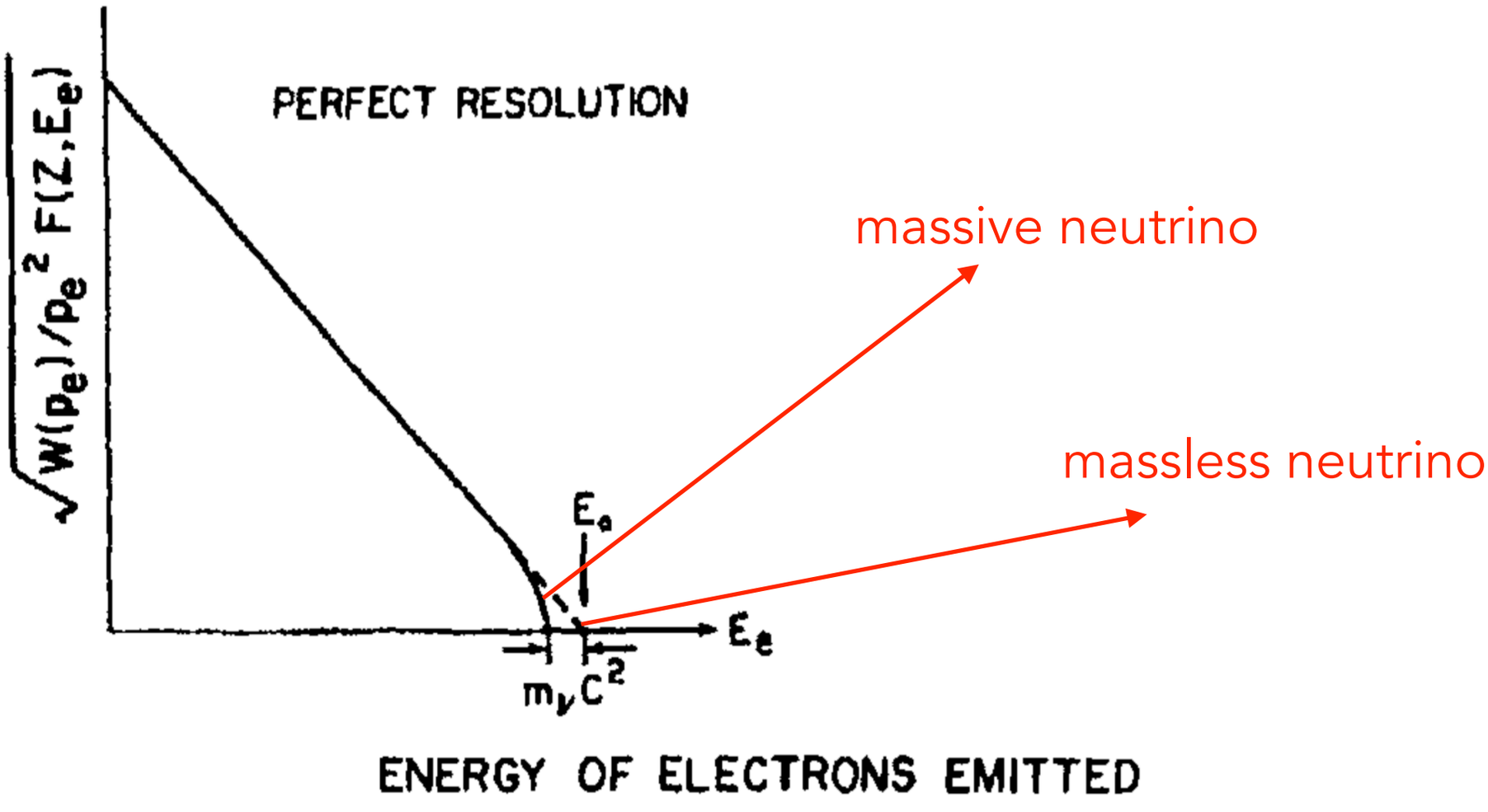


- **Goals** of the **β**-spectrometry:

  - environmental radioactivity measurements
  - investigation of nuclear structure
  - neutrino mass measurement

How can you measure the neutrino mass???

- In a three body decay the energetic spectrum of the **β** is continuum
- A Fermi-Kurie plot is a representation of the spectrum used to study the maximum energy of the electrons:



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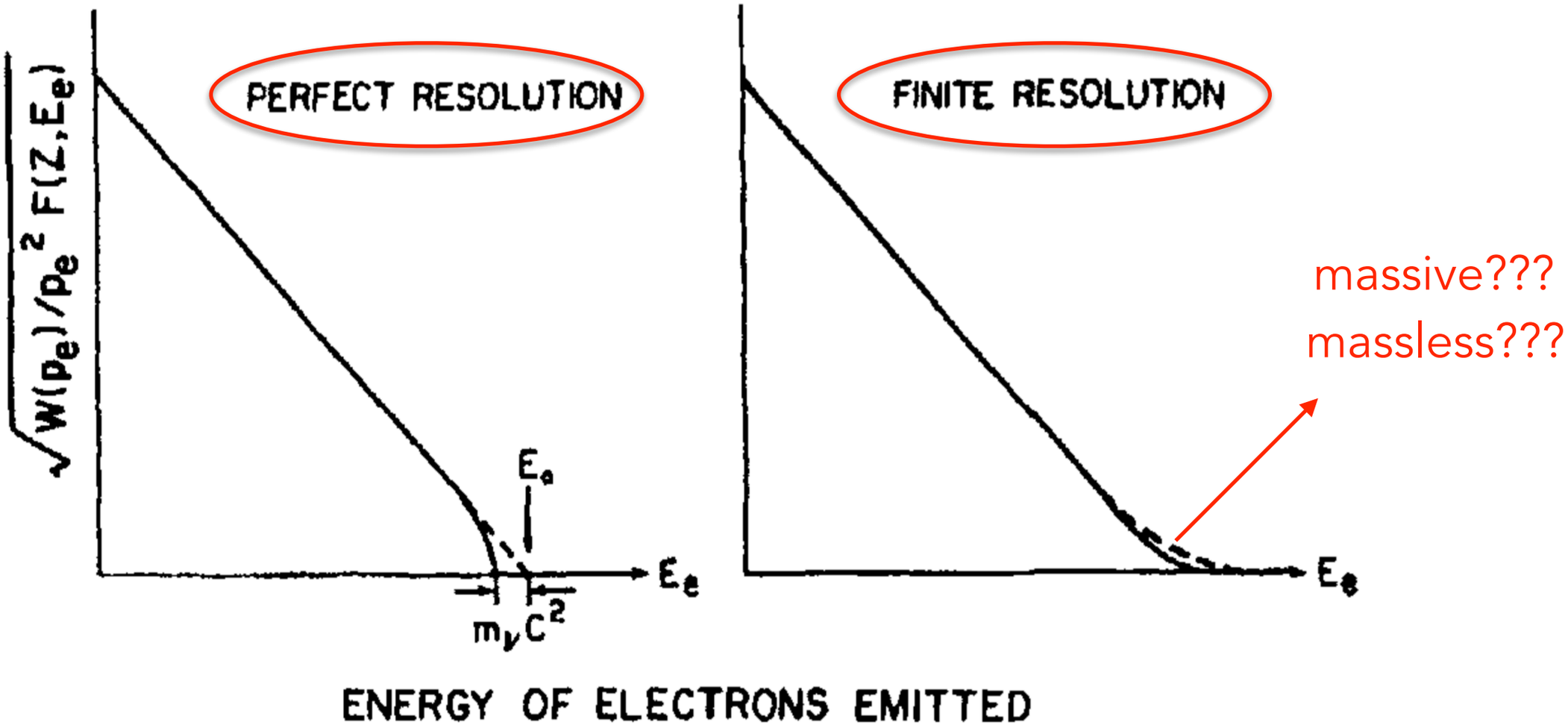
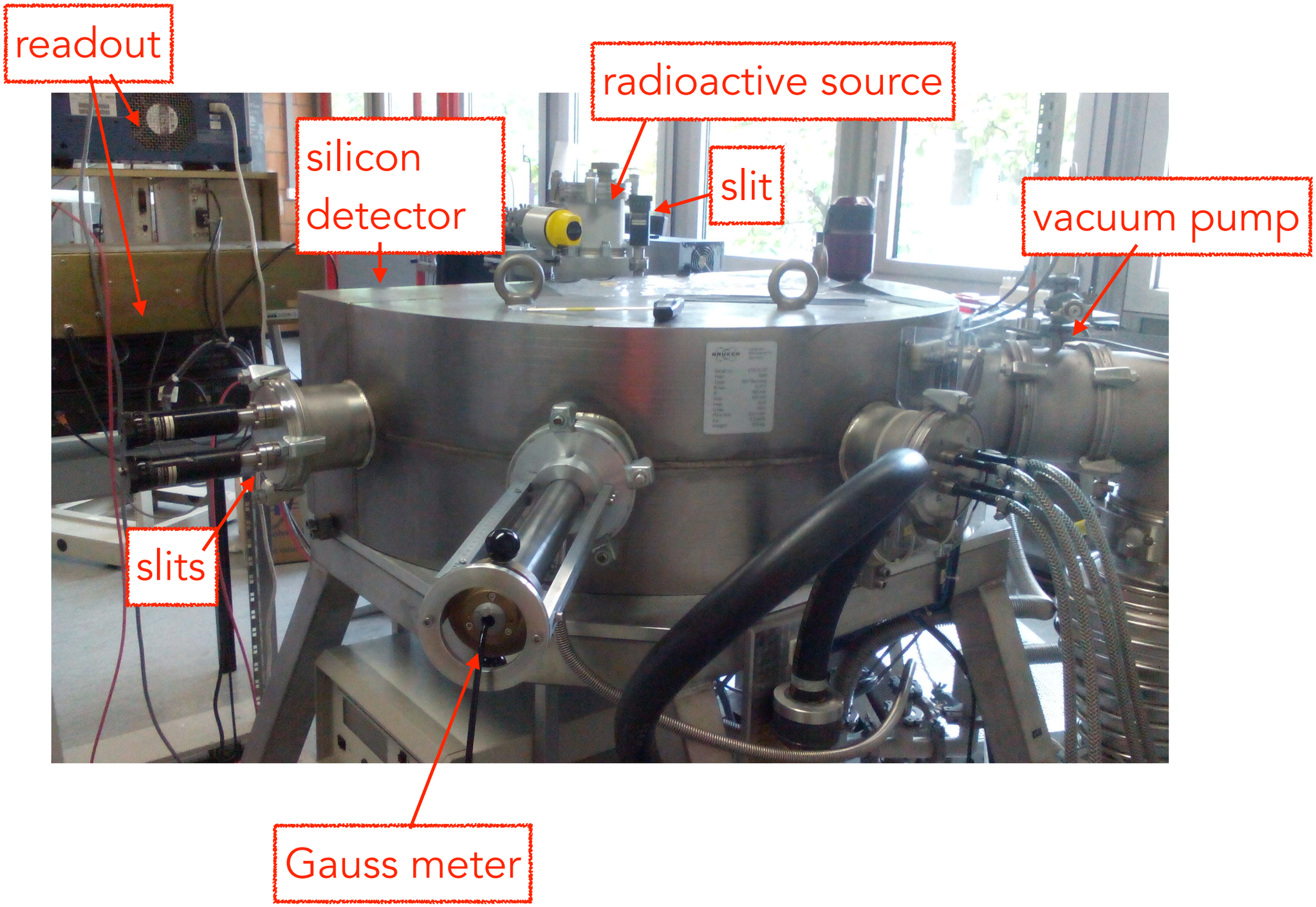


β-Spectrometer

- Detector able to measure the energy of the emitted electrons



Goals

- Learn to operate a spectrometer
- Learn to operate a silicon detector
- Setup the readout
- Calibrate the magnetic field
- Calibrate the energy selection, energy resolution and detection efficiency
- Produce the **β**-decay Fermi-Plot for the Cs 137 and interpret it
- Work on a simulation of the setup, maybe try to replicate the spectrum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감사합니다
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