



KATRIN

Background Characterization

Anna Pollithy



Invisibles18 Workshop

PhD Forum

3-7 September 2018

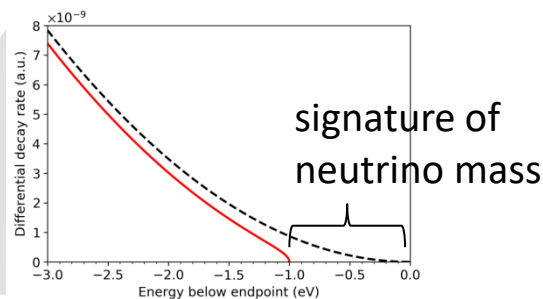
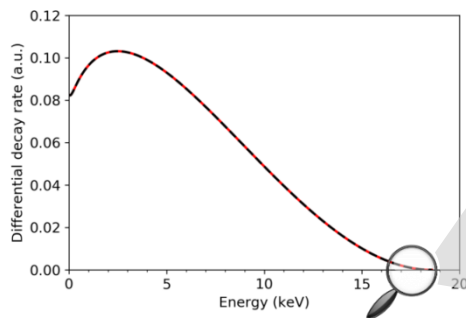
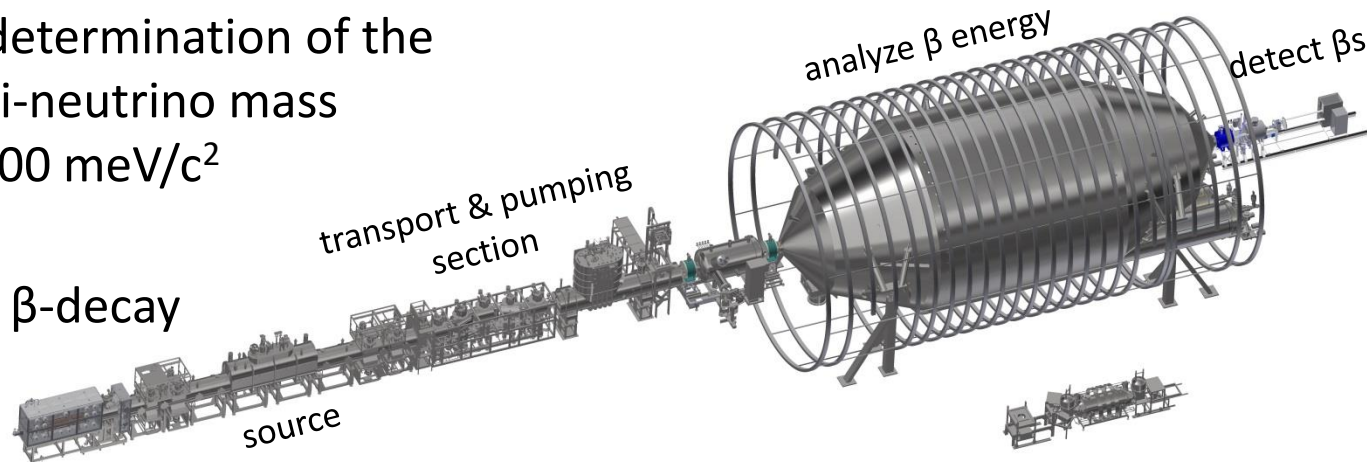
Karlsruhe Institute of Technology (KIT)

Europe/Berlin timezone

The KATRIN Experiment

model-independent determination of the effective electron anti-neutrino mass with a sensitivity of $200 \text{ meV}/c^2$

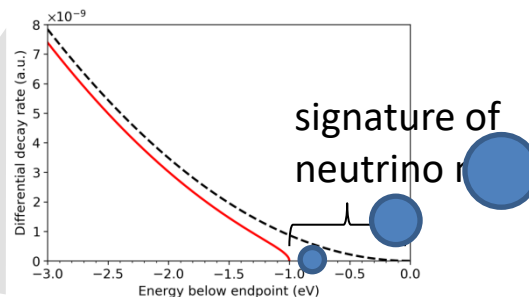
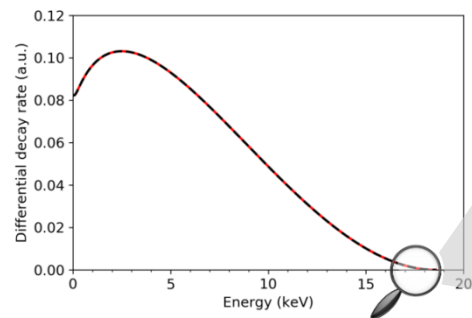
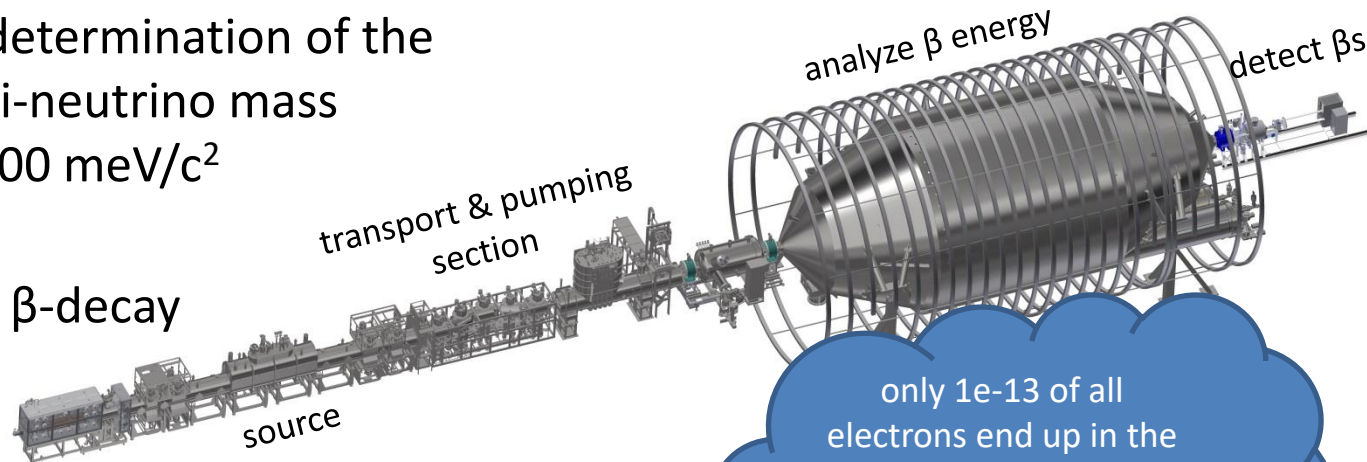
→ investigate tritium β -decay



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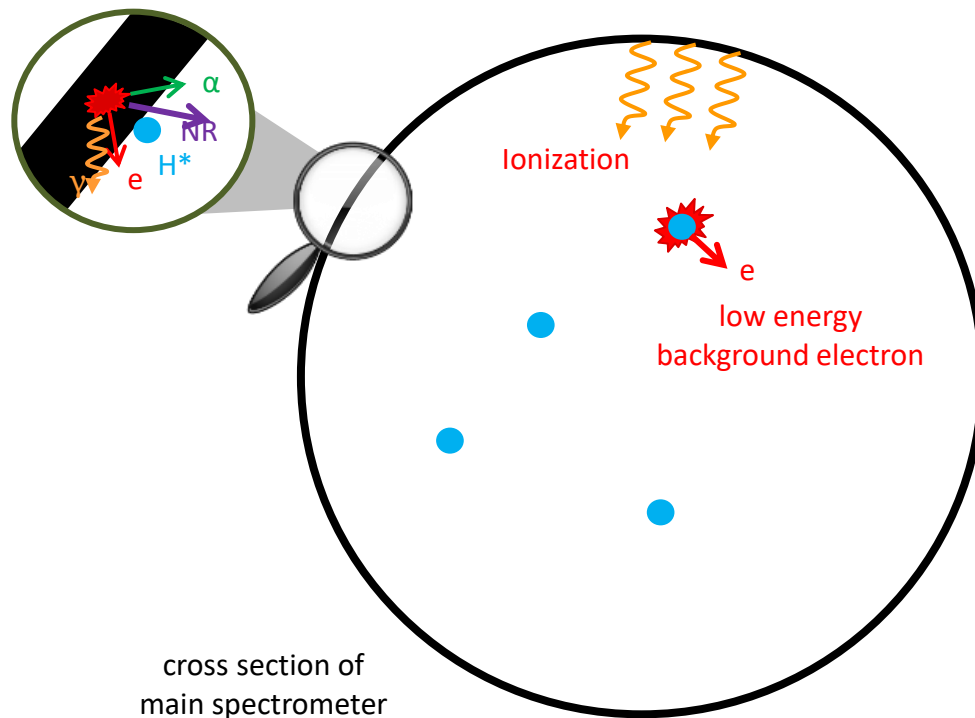
→ investigate tritium β -decay



only $1e-13$ of all electrons end up in the last eV
 → small signal rate
 → small background rate required

The Rydberg background

- hydrogen atoms in highly excited states created by e.g. internal radiation
- electron creation via thermal ionization or autoionization
- energy spectrum of electrons can give insight into creation mechanism



Energy spectrum determination

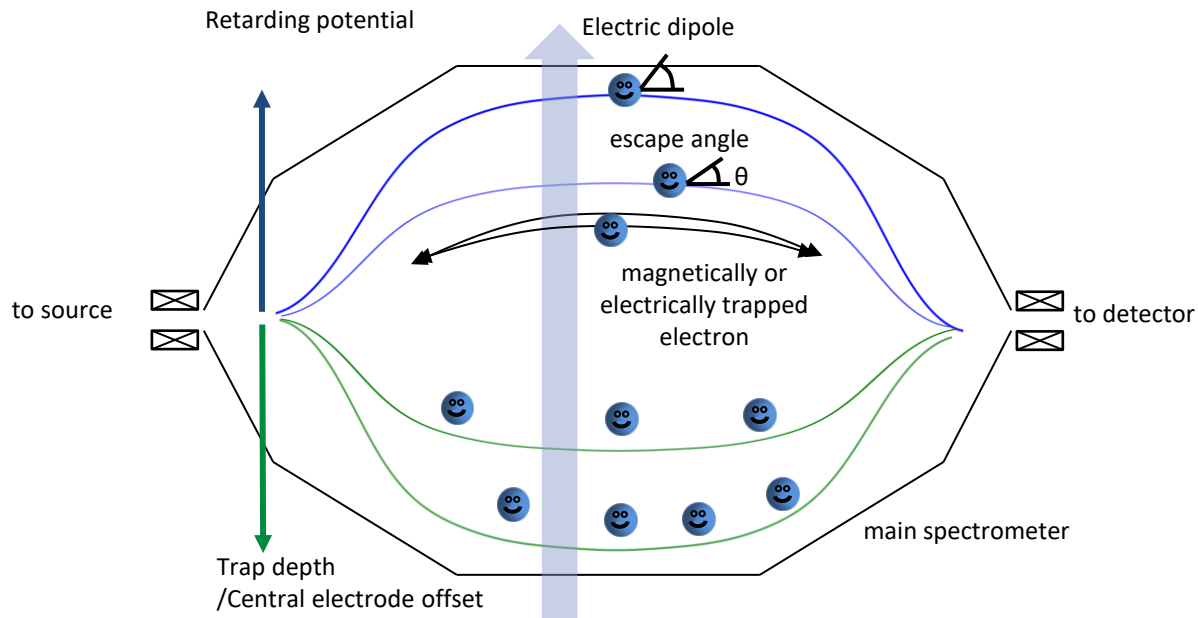
Magnetic trapping:

- Idea: trap all electrons that have **more** than a certain energy

Electric trapping:

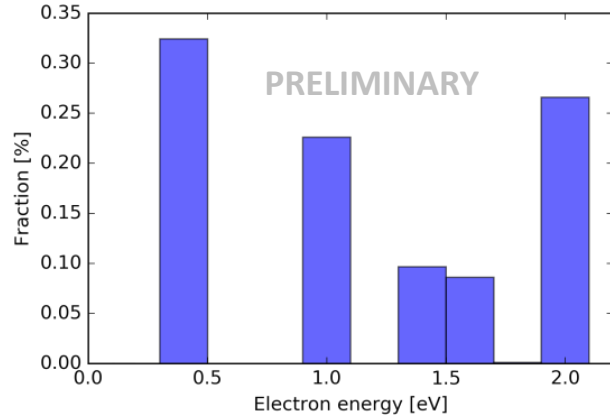
- Idea: trap all electrons that have **less** than a certain energy

- Extract the energy distribution by systematically changing the magnetic and electric trapping condition



Results

- background electrons have energies from 400 meV to 2 eV
- investigation for implication on electron creation mechanism currently ongoing
- for further information check out my poster



Special Thanks to

Susanne Mertens	Florian Fränkle
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& the KATRIN Collaboration