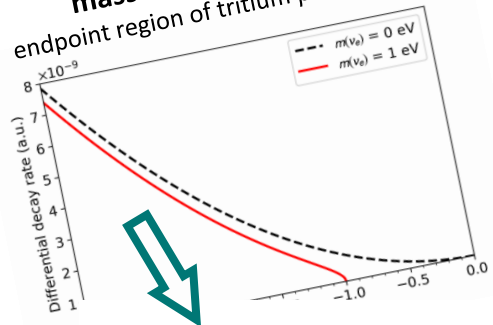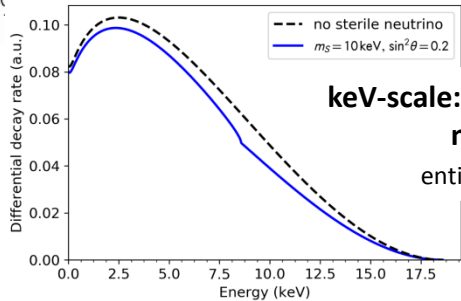# A model for a keV-scale sterile neutrino search with KATRIN
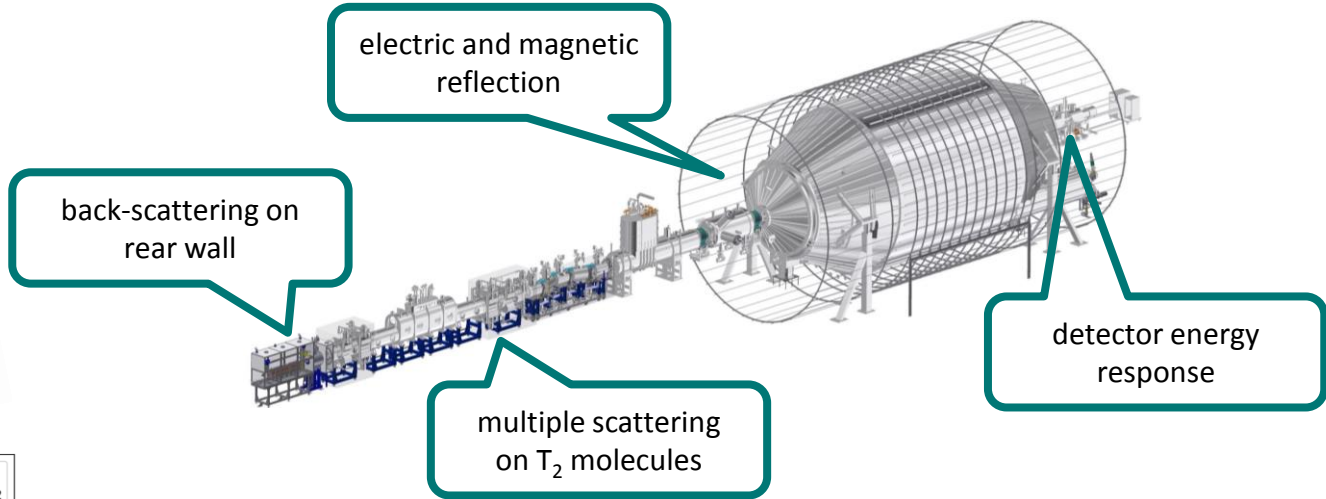
eV-scale: electron neutrino mass measurement

endpoint region of tritium β-spectrum

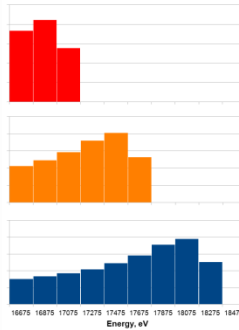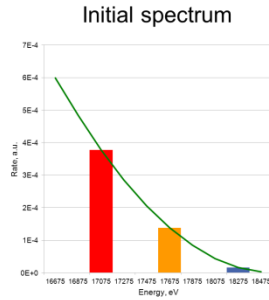**keV-scale: search for sterile neutrino**

entire tritium β-spectrum

Tritium β-spectrum far from endpoint:

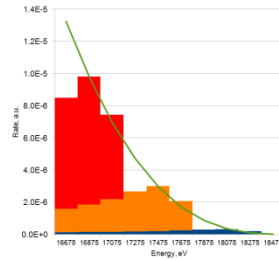electric and magnetic reflection

back-scattering on rear wall

detector energy response

multiple scattering on T_2 molecules

Need a model to describe the full tritium β-spectrum

Martin Slezák, Alexey Lokhov et al.

1

Modelling β-spectrum with response matrices

Initial spectrum

Response of a component

Measured spectrum

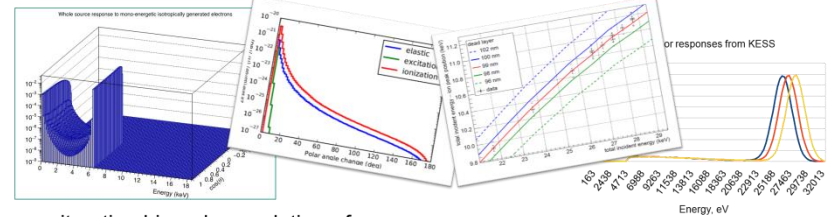Final spectrum

10 kV post-acceleration
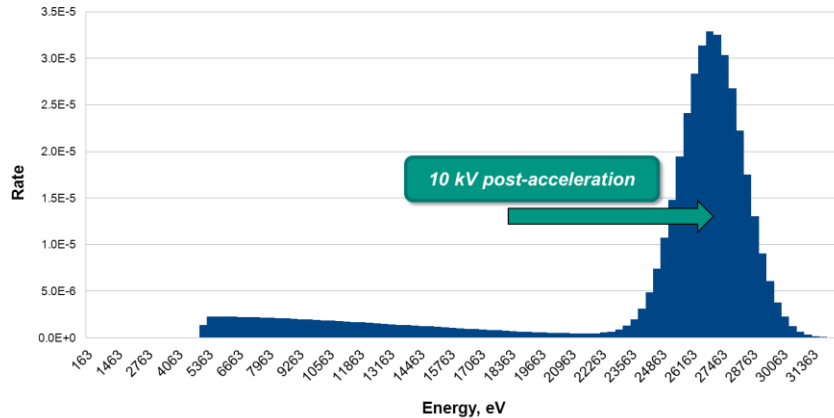
Rear wall
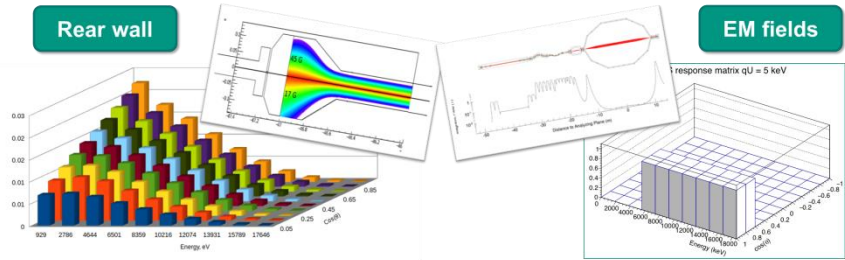
- Geant4 particle tracking simulation
- includes secondary Auger electrons

EM fields

- analytical assuming adiabatic transport
- or Kassiopeia particle tracking simulation

Source scattering

- iterative binned convolution of electron distribution with scattering differential cross section
- energy-dependent total cross-section

Detector response

- KESS particle tracking simulation in Si
- backscattering, charge sharing, pile-up, dead layer energy losses