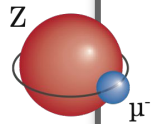


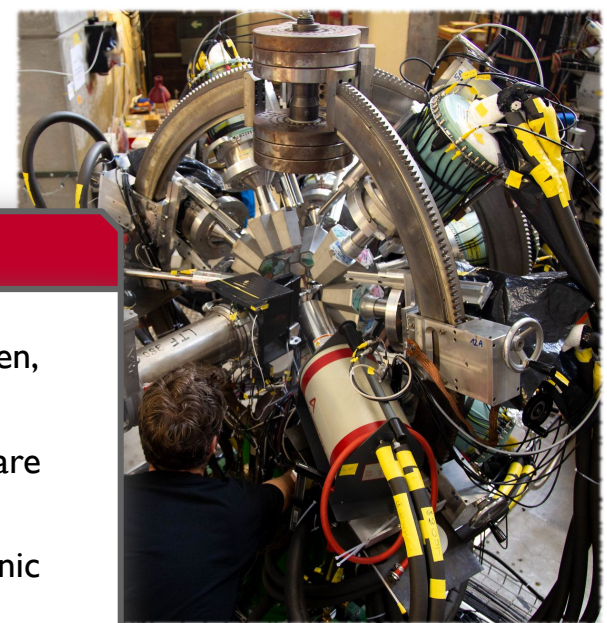
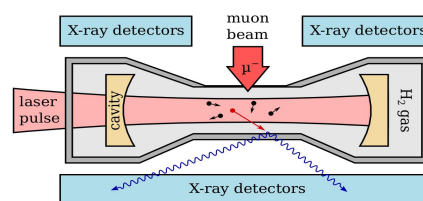
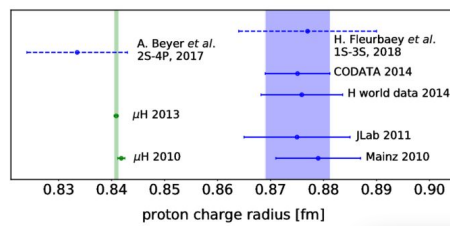
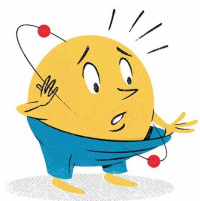
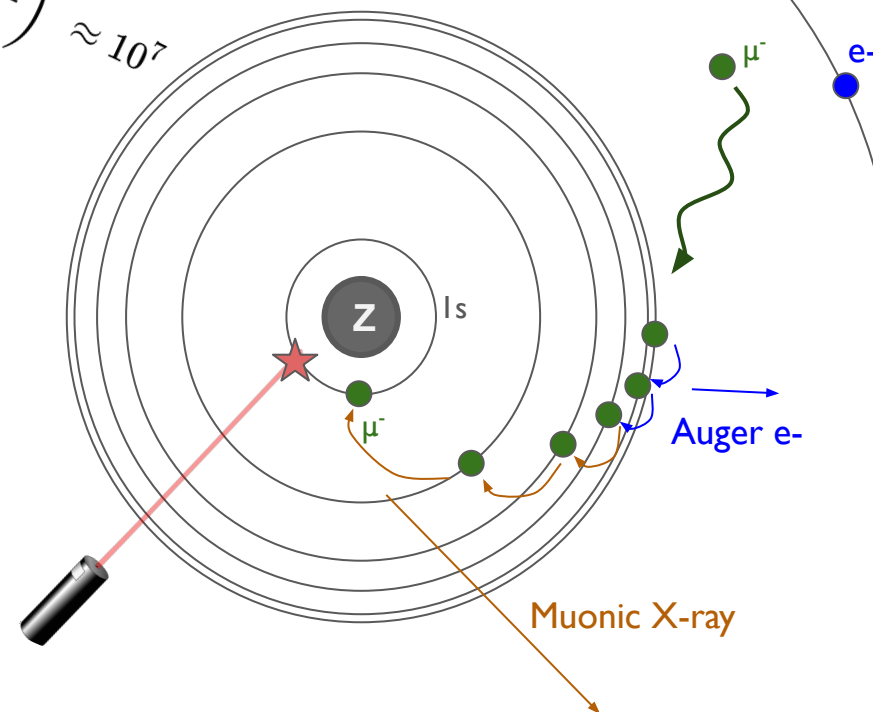
Bachelor or master projects in AGBerger or AGPohl

What are muonic atoms?

Muonic atoms are formed when negative muons come to rest and subsequently get captured by a nearby atom, where it behaves like a heavy atomic electron. When the muon cascades down to the lowest atomic orbital it, Auger electrons and X-rays are emitted. Because of its large mass of about 200 times the electron mass, the muon resides 200 times closer to the atomic nucleus. Therefore such an exotic atom is an excellent system to study short range μ -Z interactions and finite size effects.

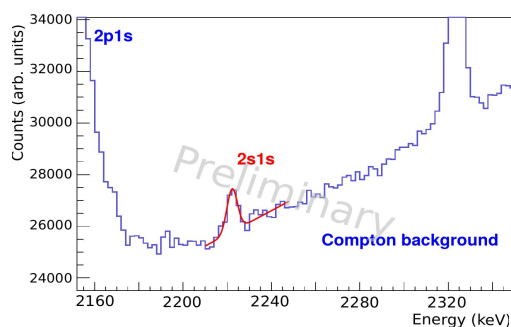
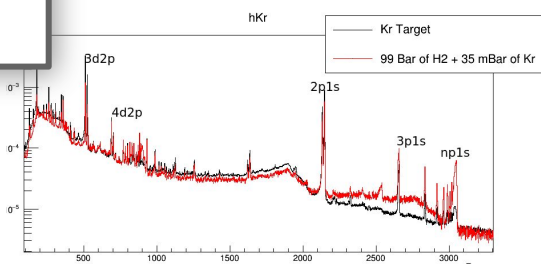
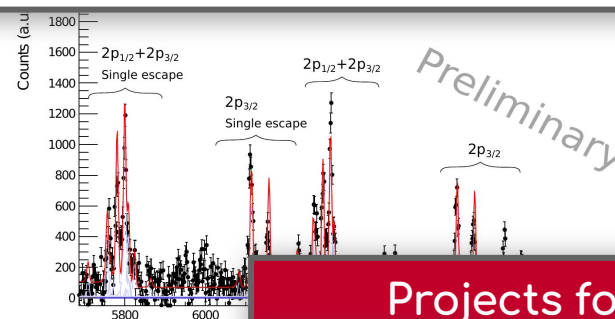
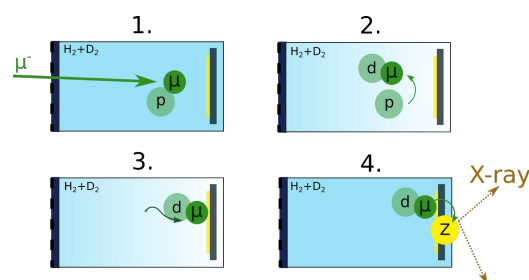


$$\left(\frac{m_\mu}{m_e}\right)^3 \approx 10^7$$

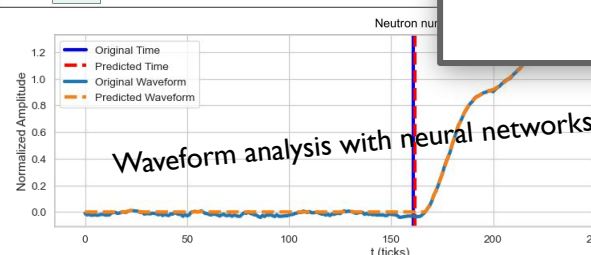
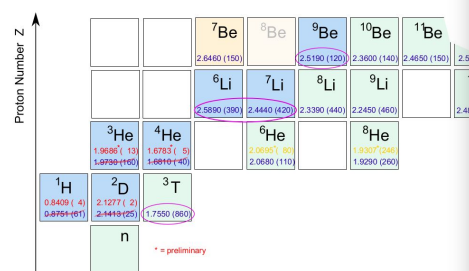


Exotic atom spectroscopy @ JGU

- ❑ Laser spectroscopy on muonic hydrogen, measuring the magnetic radius of the proton
- ❑ Muonic X-ray cascade measurements with rare and radioactive isotopes
- ❑ Precision spectroscopy with novel cryogenic micro-calorimeters
- ❑ Muonic atom parity violation studies



Charge radii: The future



Projects for motivated students

- ❑ Yearly measurement campaigns at the Paul Scherrer Institute (Switzerland)
- ❑ Data-acquisition development for the *muX* and *HyperMu* experiments
- ❑ Data-analysis of muonic X-ray data
- ❑ Geant4 Monte-Carlo simulations to aid detector design

