

① Highly ionizing tracks: (ATLAS)

- Search for highly ionizing tracks, eg charginos, staus, R-hadrons, ...
- Use $m_{dE/dx} \equiv \frac{p_{T,co}}{\beta\gamma \langle dE/dx \rangle_{corr}}$ to reconstruct mass
- ↳ Actually, interpretation of charge-2e particle excluded by CMS

① W mass:

- Measure from CDF II precise and really off
- Recent CMS result: within SM prediction

① H $\rightarrow \gamma\gamma$:

- Looking for resonance at lower mass
- ↳ 2.9 σ excess at $m \sim 95$ GeV

① Anomalous magnetic moment μ_{μ} ($g-2$):

- $\mu = (1+a) \frac{q\hbar}{2m}$ when $a = \frac{g-2}{2}$, expected to be ≈ 0

Prediction: $a_{\mu}^{SM} = a_{\mu}^{QED} + a_{\mu}^{EW} + a_{\mu}^{had} = 0,001\,165\,947\,64 \pm 0,000\,000\,039$

Measurement: $0,001\,165\,920\,9(6)$

↳ 4.2 σ !

- New experiment at Fermilab: "g-2"
- New "BMW" paper \Rightarrow new theoretical prediction: only 1.5 σ of tension.

① Muonic hydrogen: proton radius puzzle:

- Actually, no problem in the end.

① Beryllium anomaly:

- Atonki experiment: new boson \Leftrightarrow transition in ^9Be

⊙ DAMA:

→ Seasonal DM observed (?) in NaI crystal.

⊙ Reactor anomaly:

→ Deficit of $\bar{\nu}_e$ close to reactor cores

→ Could be explain by a 4th sterile neutrino

CN3 THEORETICAL LANDSCAPE

→ Standard Model = Effective field theory (EFT)

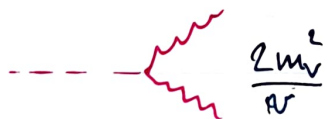
→ Scalar sector: least constraint, room for BSM physics

⊙ Scalar sector:

→ Higgs sector determined by only 1 free parameter: m_H

→ very predictive

→ coupling to vector boson exactly defined


$$\frac{2m_f^2}{q^2}$$


$$\frac{3m_H^2}{q^2}$$


$$\frac{2m_f^2}{q^2}$$


$$\frac{3m_H^2}{q^2}$$

→ After discovery (mass, spin), 1) coupling to bosons and fermions
2) self coupling

→ All these measurements are tests for BSM physics

ex of BSM: non-minimal Higgs scenarios

alternative to EWSB (ex: Higgs impostor)