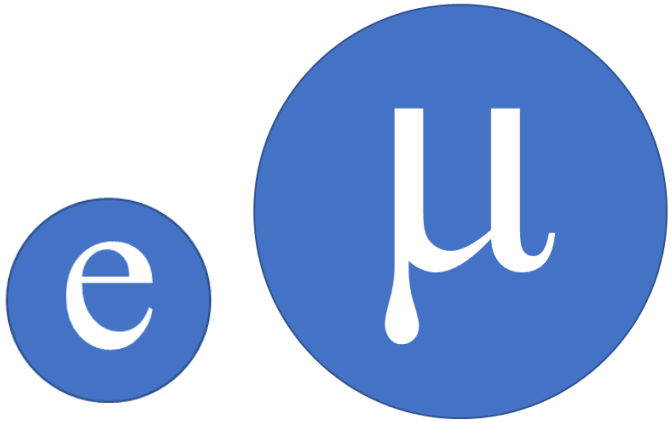
The muon g-2 anomaly

Our adventure in the quantum wonderland of quirky spinning tops

Let’s start from the beginning:

What is a muon?

Muons spin!



Precession

g factor

80 years ago, scientists believed that g should be 2 but…

Nature is much more complicated

Therefore, we need to measure g-2 very precisely…

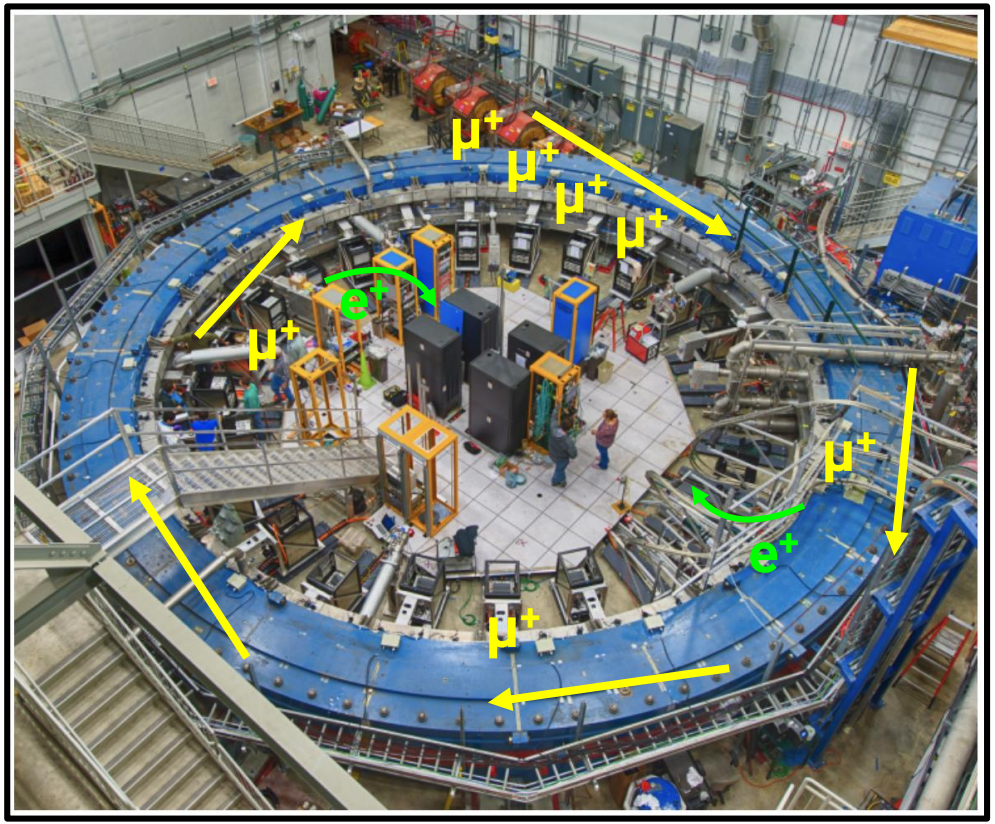

Length

The experiment

A 15-meter-wide electromagnet was transported 5150 km over sea and land!

The experiment

The experiment

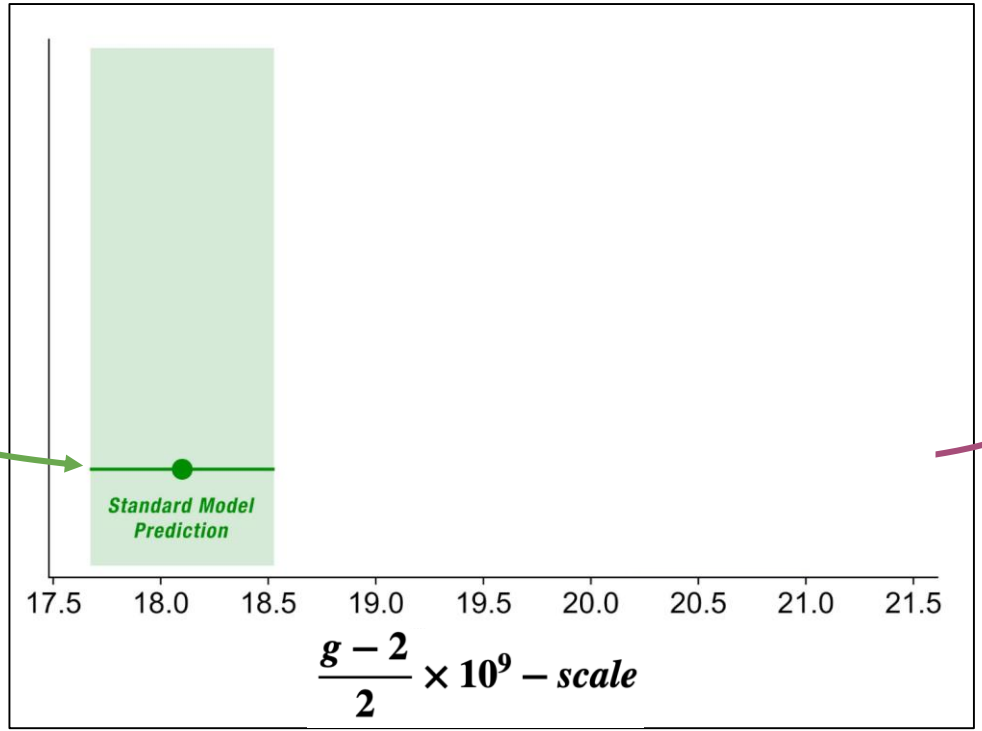


$\mu^+ \longrightarrow e^+ +$ other particles

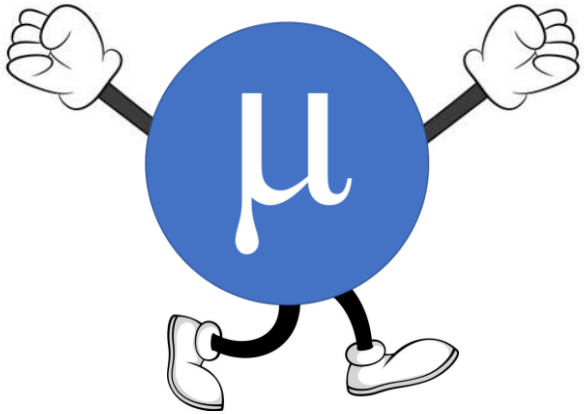
$g - 2 = 0.00233184122 \pm 0.00000000082$

There is a big difference!

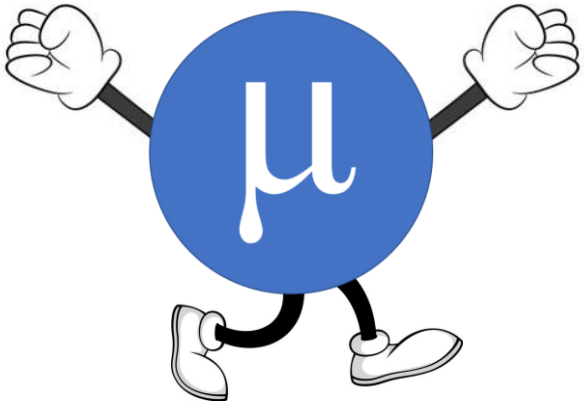
What we **expect**

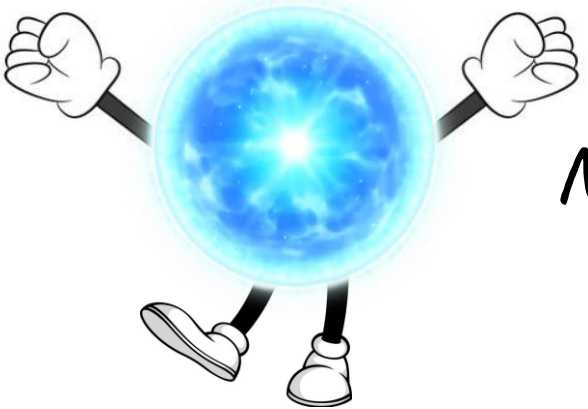


What we **observe**



DARK MATTER?





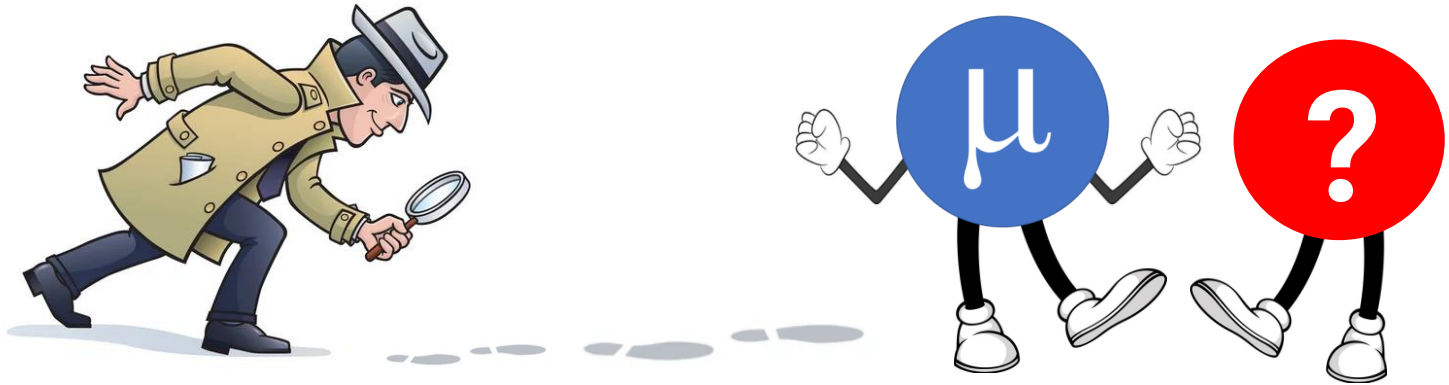
NEW FORCES?

Jesus?

The search continues!

We are hopefully close to discovering something new!

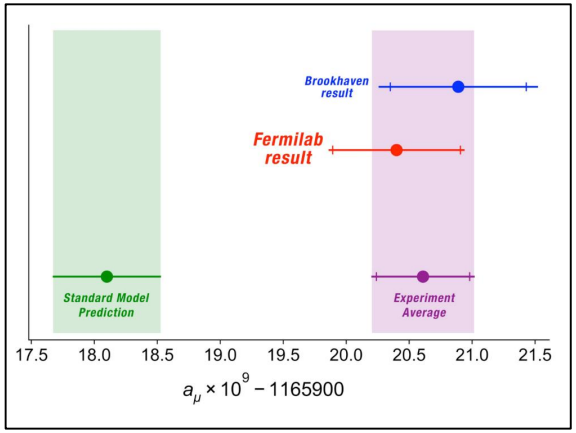
Just a few more steps



In case you’re interested

Hit the like and the subscribe buttons,
Make sure that the red bell turns gray.

But you're not showing g - 2?



Not g - 2!

$$a_\mu = \frac{g-2}{2}$$

The parameter, a, is related to g -2. We then scale it to give us some nicer numbers. This doesn't change the physics!

What upgrades are being done to the experiment?

- Kicker - Keeps the muons on track.
- Magnets - Some small problems with their operation were noticed during run one. These have been fixed for the following runs.
- Temperature in the experiment hall - Small changes in temperature can cause the magnet to change size which distorts the magnetic field. This can affect our precision.