

# AnimaScience

7 mai 2021

# Muon anomalous magnetic moment : g-2

Due to their spin, leptons (electron, muon, tau) behaves like small magnets

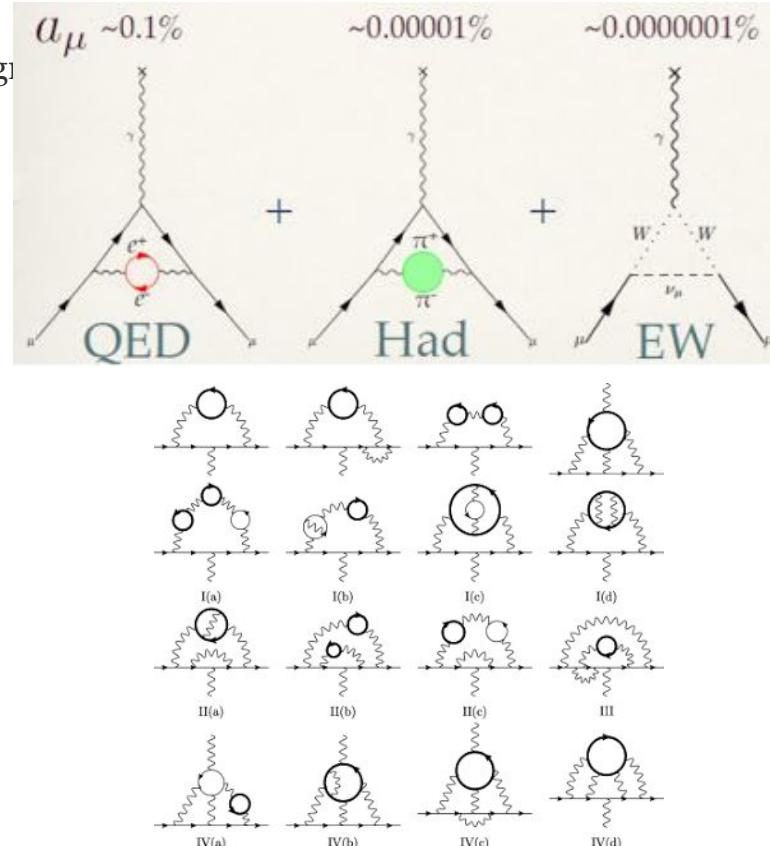
Intrinsic magnetic moment:  $\mathbf{M} = -g\mu_b \mathbf{J}$

- $\mu_b$ : Bohr magneton  $\mu_b = e\hbar/2m_e$
- $J$ : spin
- $g$ : Landé factor

At first order  $g = 2$  but radiative corrections  $\Rightarrow g > 2$

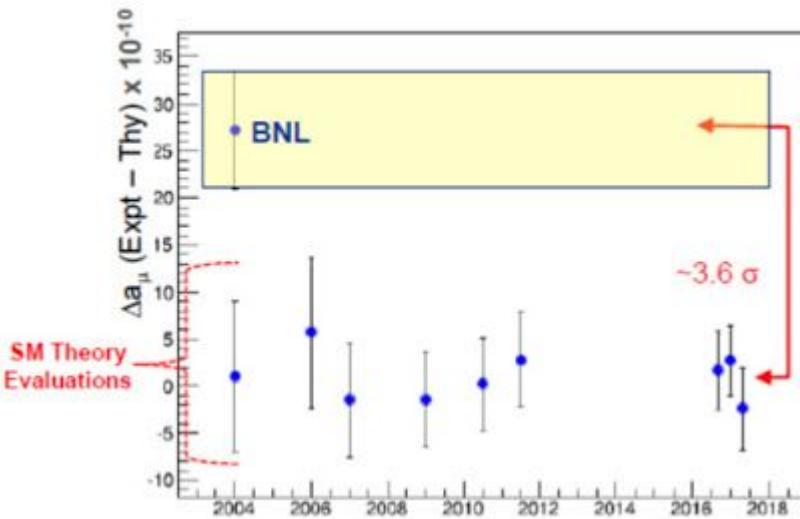
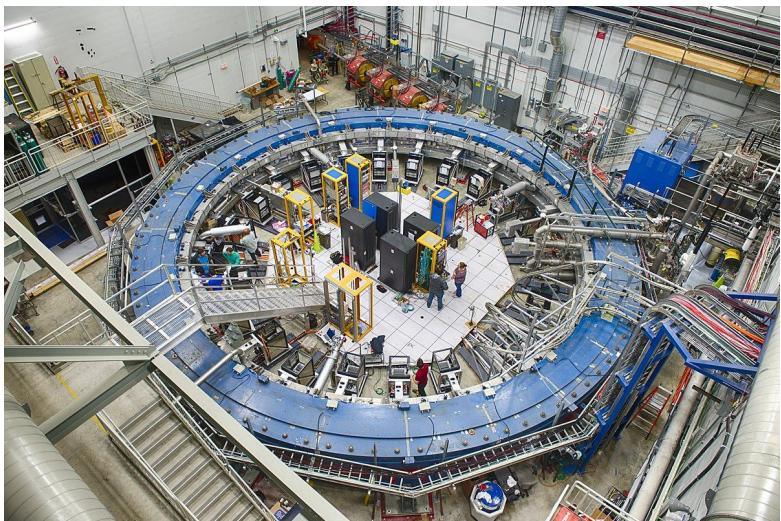
Practically we use  $\mathbf{a} = (\mathbf{g-2})/2$

- $\mathbf{a}$  can be calculated with a very high precision
- $a_\mu$  is potentially more sensitive to new physics than  $a_e$

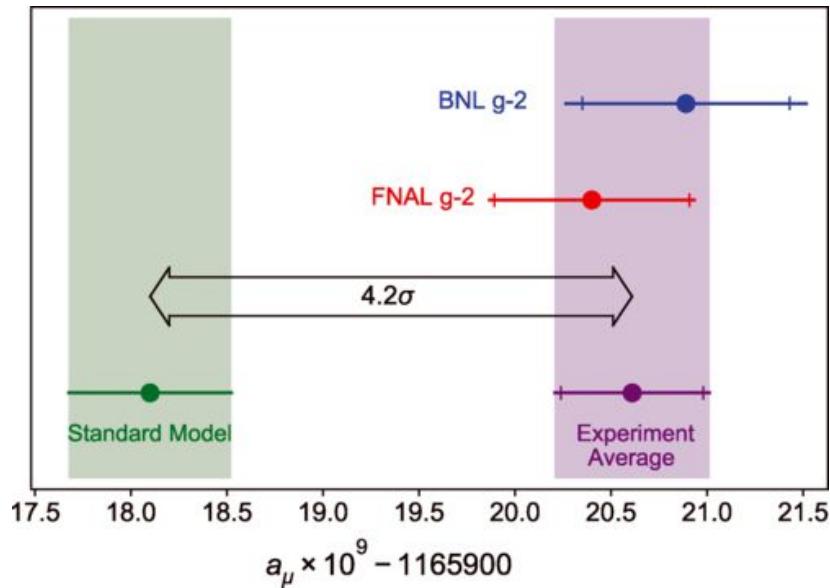


Several measurements since 1959 (CERN)

- 1984 - 2004 : BNL
- 2011 : FNAL - Mesures de 2017 à 2020



# Results presented on April 7, 2021



Same day publication in Nature of a Lattice QCD calculation of the hadronic contribution to  $a_\mu$

2 $\sigma$  tension with respect to previous estimates end closer to the experimental value !

<https://www.nature.com/articles/s41586-021-03418-1>

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.126.141801>

See also: <https://cerncourier.com/a/fermilab-strengthens-muon-g-2-anomaly/>