

**Wits ICPP-iThemba LABS
Seminars in Particle Physics**

Report of Contributions

Contribution ID: 1

Type: **not specified**

New results from the Muon g-2 experiment at Fermilab

Wednesday, 30 June 2021 14:30 (1 hour)

At the beginning of 2000's the E821 experiment at Brookhaven (USA) has measured the anomalous magnetic moment of the muon (known also as muon g-2) with a precision of 0.54 parts per million, finding a discrepancy of about three standard deviations with the theoretical prediction of the Standard

Model. This longstanding discrepancy is one of the most intriguing hints of new physics in particle physics. In order to understand this discrepancy a new Muon g-2 experiment has been approved at Fermilab (USA) and started taking data in 2018. We will report the first results of the new Muon g-2

Experiment at Fermilab which measured the muon g-2 with a precision slightly better than the BNL one

Presenter: Prof. VENANZONI, Graziano

Contribution ID: 2

Type: **not specified**

Muon $g-2$ in the standard model and a lattice QCD calculation of the leading hadronic contribution

Wednesday, 21 July 2021 14:30 (1 hour)

Twenty years ago in an experiment at Brookhaven National Laboratory, physicists measured the muon's

anomalous magnetic moment, a_μ , with a remarkable precision of 0.54 parts per million.

Since then, the standard model prediction for a_μ has exhibited a discrepancy with experiment of over 3

standard deviations, raising the tantalising possibility of physical particles or forces as yet undiscovered.

On April 7 a new experiment at Fermilab presented its first results, brilliantly confirming Brookhaven's measurement and bringing the discrepancy with the standard model to a near discovery level of 4.2. To

fully leverage this and future measurements, and possibly claim the presence of new fundamental physics, it is imperative to check the standard model prediction with independent methods, and to reduce

its uncertainties. After an introduction and a discussion of the current experimental and theoretical status

of a_μ , I will present a precise lattice QCD calculation, by the BMW collaboration, of the contribution to

this quantity that most limits the precision of the standard model prediction. The result of this calculation significantly reduces the gap between the standard model and experiment, and suggests that

new physics may not be needed to explain the current, experimental, world-average value of

Presenter: Prof. LELLOUCH, Laurent (CNRS & Aix-Marseille U)

Contribution ID: 3

Type: **not specified**

Which way beyond the Standard Model is the muon magnetic moment pointing?

The Fermilab muon $g-2$ experiment has recently confirmed the previous Brookhaven measurement, and both are in apparent tension with calculations within the Standard Model. After reviewing the history of theoretical calculations and experimental measurements of the muon $g-2$, I will discuss possible interpretations of this tension, including alternative Standard Model calculations as well as scenarios for physics beyond the Standard Model, including leptoquarks, a Z' boson and supersymmetry.

Presenter: Prof. ELLIS, John (CBE FRS King's College London)

Contribution ID: 4

Type: **not specified**

Which way beyond the Standard Model is the muon magnetic moment pointing?

Wednesday, 11 August 2021 14:30 (1 hour)

The Fermilab muon $g-2$ experiment has recently confirmed the previous Brookhaven measurement, and both are in apparent tension with calculations within the Standard Model. After reviewing the history of theoretical calculations and experimental measurements of the muon $g-2$, I will discuss possible interpretations of this tension, including alternative Standard Model calculations as well as scenarios for physics beyond the Standard Model, including leptoquarks, a Z' boson and supersymmetry.

Presenter: Prof. ELLIS, John (CBE FRS King's College London)

Contribution ID: 5

Type: **not specified**

Overview of heavy-flavor measurements in ALICE at the LHC for the ALICE Collaboration

The ALICE detector at the LHC is dedicated to the study of the properties of the hot and dense QCD matter (quark-gluon plasma) produced in nucleus-nucleus collisions at ultra-relativistic energies. The heavy flavor (charm and beauty) quarks, having large masses, are produced in hard-parton scatterings at the early stages of the collisions. Their measurements in pp collisions are an important test of perturbative Quantum Chromodynamics (pQCD) and a reference for measurements in p-Pb and Pb-Pb collision systems. Heavy-flavor measurements in Pb-Pb collisions enable studying the properties of the QGP medium by investigating the interaction of its constituents with the heavy quarks traversing it. Studies in p-Pb collisions allow us to disentangle cold nuclear effects. This contribution presents an overview of recent ALICE results for open heavy flavors in pp, p-Pb, and Pb-Pb collision systems.

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Presenter: Dr NAIK, Bharati (iThamba Labs, Wits)