



UNIVERSITA' DEGLI STUDI DI PAVIA

DOTTORATO DI RICERCA IN FISICA

COLLOQUIA 2015-2016

Seminari di Fisica Teorica e Matematica

Giovedì 21 Aprile 2016

Aula 102 "L. Giulotto", ore 16.00

Dipartimento di Fisica, via Bassi 6, Pavia

Testing the Standard Model with the lepton $g-2$

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Abstract: The anomalous magnetic moment of the muon (the muon " $g-2$ ") is one of the most celebrated tests of the Standard Model. On the other hand, it is believed that new-physics contributions to the electron $g-2$ are too small to be relevant and, with this assumption, its measurement is employed to determine the fine-structure constant. I will discuss some recent developments in the long-standing discrepancy between experiment and the Standard Model prediction of the muon $g-2$ and argue that the electron $g-2$ may be used to probe new physics as well.

I will also discuss possible methods to improve the present limits on the $g-2$ of the tau lepton using radiative leptonic tau decays. I will conclude discussing the puzzling 3.5 sigma discrepancy which has recently been observed between the standard model prediction of the branching ratio $\tau \rightarrow e \bar{\nu}_e \nu_\tau$ and its measurement at BaBar.

