



Some Results on Lepton Flavour Universality Violation

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Introduction

Why flavour physics?

Some B physics anomalies

- Theoretical interest: why do fermions have a large range of masses ($m_t/m_e \approx 350000$)?
- Flavour physics is (one of) the best places to look for New Physics.
 - Flavour Changing Neutral processes are heavily suppressed in the SM (loop and mass suppressed).
 - But New Physics might be not so suppressed: sizable contributions.
- Experiments are capable of good sensitivities: LHCb, BaBar, Belle.

- Rare B decays: $b \rightarrow s\mu^+\mu^-$ and $b \rightarrow se^+e^-$:
 - $R_{K^{(*)}} = \frac{\mathcal{B}(B \rightarrow K^{(*)}\mu^+\mu^-)}{\mathcal{B}(B \rightarrow K^{(*)}e^+e^-)}$.
 - $R_K^{\text{SM}} = 1.00 \pm 0.01$, $R_K^{\text{exp}} = 0.745_{-0.074}^{+0.090} \pm 0.036$,
(2.6σ).¹
 - $R_{K^*}^{\text{SM}} = 1.00 \pm 0.01$, $R_{K^*}^{\text{exp}} = 0.685_{-0.069}^{+0.113} \pm 0.047$,
(2.5σ).²
 - Angular observables P'_4, P'_5 .
 - Violation of Lepton Flavour Universality?
- B_s mixing:
 - $\Delta M_S^{\text{SM}} = 20.01 \pm 1.25 \text{ ps}^{-1}$,
 $\Delta M_S^{\text{exp}} = 17.757 \pm 0.021 \text{ ps}^{-1}$, (1.8σ).³

¹R. Aaij *et al* (LHCb Collaboration) arXiv:1406.6482

²S. Bifani. CERN Seminar, 18 April 2017 & arXiv:1705.05802

³L. Di Luzio, M. Kirk, A. Lenz. arXiv:1712.06572