Contribution ID: **32** Type: **Talk in young researcher session**

A novel theoretical approach to $R(D^{(*)})$ through the Dispersive Matrix method

Monday 4 July 2022 14:30 (15 minutes)

The ratios $R(D^{(*)})$ are defined as the τ/μ ratio of the branching fractions of exclusive semileptonic $B \to D^{(*)}$ decays. They are a powerful test of Lepton Flavour Universality, one of the pillars of the SM, and are determined by the hadronic Form Factors (FFs) describing the $B \to D^{(*)}$ decays. Through the novel Dispersive Matrix (DM) approach, we describe these FFs without assumptions on their functional dependence on the momentum transfer. The DM method is based on the non-perturbative determination of the dispersive bounds due to unitarity and analyticity, and allows to determine in a model-independent way the FFs in the full kinematical range, starting from existing Lattice QCD data which are available only at large momentum transfer. Using the unitarity bands of the FFs, which are thus independent of the experimental determinations of the differential decay widths, we compute new fully-theoretical expectations of the anomalies. Our results read $R(D) = 0.296(8)$ and $R(D^*) = 0.275(8)$, each of which is compatible with the corresponding world average of the measurements at the $\sim 1.3\sigma$ level. The origin of the discrepancy between the DM estimates and the HFLAV SM predictions will be also discussed.

Authors: MARTINELLI, Guido (Sapienza Universita e INFN, Roma I (IT)); NAVIGLIO, Manuel; SIMULA, Silvano (INFN - Sezione di Roma Tre); VITTORIO, Ludovico (SNS, Pisa)

Presenter: VITTORIO, Ludovico (SNS, Pisa)

Session Classification: Young researcher session

Track Classification: Young researcher session