The 38th International Symposium on Lattice Field Theory

LATTICE 21

JULY 26-30 2021, ZOOM/GATHER@MIT

Contribution ID: **104** Type: **Oral presentation**

Non-Perturbative Bounds for Semileptonic Decays in Lattice QCD

Thursday 29 July 2021 14:45 (15 minutes)

We present a new method aiming at a non-perturbative, model-independent determination of the momentum dependence of the form factors entering hadronic semileptonic decays using unitarity and analyticity constraints. We extend the original proposal of Ref. [1] and, using suitable two-point functions computed non-perturbatively, we determine the form factors at low-momentum transfer q^2 from those computed explicitly on the lattice at large q^2, without making any assumption about their q^2 dependence. As a training ground we apply the new method to the analysis of the lattice data of the semileptonic $D \to K\ell\nu_\ell$ decays obtained in Ref. [2] both at finite values of the lattice spacing and at the physical pion point in the continuum limit. We show that, starting from a limited set of data at large q^2 it is possible to determine quite precisely the form factors in a model independent way in the full kinematical range, obtaining a remarkable agreement with the direct calculation of the form factors of Ref. [2]. This finding opens the possibility to obtain non-perturbatively the form factors entering the semileptonic B decays in their full kinematical range.

References

[1] L. Lellouch, Nucl. Phys. B **479**(1996), 353-391 doi:10.1016/0550-3213(96)00443-9 [arXiv:hep-ph/9509358 [hep-ph]]
[2] V. Lubicz et al. [ETM],Phys. Rev. D **96** (2017) no.5, 054514 [erratum: Phys. Rev. D **99** (2019) no.9, 099902; erratum: Phys. Rev. D **100** (2019) no.7, 079901] doi:10.1103/PhysRevD.96.054514 [arXiv:1706.03017 [hep-lat]].

Primary authors: Dr DI CARLO, Matteo (University of Edinburgh); MARTINELLI, Guido (Sapienza Universita e INFN, Roma I (IT)); NAVIGLIO, Manuel (INFN - National Institute for Nuclear Physics, Dipartimento di Fisica dell'Università di Pisa); Dr SANFILIPPO, Francesco (INFN - Sezione di Roma Tre); Dr SIMULA, Silvano (INFN - Sezione di Roma Tre); VITTORIO, Ludovico (SNS, Pisa)

Presenter: NAVIGLIO, Manuel (INFN - National Institute for Nuclear Physics, Dipartimento di Fisica dell' Università di Pisa)

Session Classification: Standard Model Parameters

Track Classification: Standard Model Parameters