

T 33: Flavourphysik 1 (Theorie)

Zeit: Montag 16:45–18:15

Raum: K.12.20 (K2)

T 33.1 Mo 16:45 K.12.20 (K2)

Sum rules in flavour models — ●JULIA GEHRLEIN, JENS P. OPPERMANN, DANIELA SCHÄFER, and MARTIN SPINRATH — Karlsruhe Institute of Technology, Karlsruhe, Germany

Flavour models with more predictions have a greater significance. Apart from predicting single observables sum rules show correlations between several observables. As an example for a flavour model including sum rules we study an $SU(5) \times A_5$ model which exhibits a neutrino mass sum rule and golden ratio mixing in the neutrino sector which is corrected from the charged lepton Yukawa couplings. The mass sum rule allows for both mass orderings but we will show that inverted ordering is not valid in this setup. Furthermore a sum rule for the angles appears due to the non-diagonal charged lepton basis. The sum rules allow us to analyse the renormalization group effects on the parameters in the neutrino sector. For normal ordering we find m_1 of about 10-50 meV and all leptonic mixing angles in agreement with experiment. If time allows we will study the implications of sum rules on more general ground.

T 33.2 Mo 17:00 K.12.20 (K2)

$B \rightarrow K^{(*)}\nu\bar{\nu}$ decays in the Standard Model and beyond — ANDRZEJ BURAS¹, JENNIFER GIRRBACH-NOE¹, ●CHRISTOPH NIEHOFF², and DAVID STRAUB² — ¹TUM Institute for Advanced Study, Lichtenbergstr. 2a, 85748 Garching — ²Excellence Cluster Universe, TUM, Boltzmannstr. 2, 85748 Garching

We present an analysis of the rare exclusive B decays $B \rightarrow K\nu\bar{\nu}$ and $B \rightarrow K^*\nu\bar{\nu}$ within the Standard Model (SM), in a model-independent manner, and in a number of new physics (NP) models. Using recent form factor determinations we obtain SM predictions that are more precise and more robust than previous estimates. Beyond the SM, we make use of an effective theory with dimension-six operators invariant under the SM gauge symmetries to relate NP effects in $b \rightarrow s\nu\bar{\nu}$ transitions to $b \rightarrow s\ell^+\ell^-$ transitions and use the wealth of experimental data on $B \rightarrow K^{(*)}\ell^+\ell^-$ and related modes to constrain NP effects in $B \rightarrow K^{(*)}\nu\bar{\nu}$. We then consider several specific NP models, including Z' models, the MSSM, models with partial compositeness, and leptoquark models, demonstrating that the correlations between $b \rightarrow s\nu\bar{\nu}$ observables among themselves and with $B_s \rightarrow \mu^+\mu^-$ and $b \rightarrow s\ell^+\ell^-$ transitions offer powerful tests of NP with new right-handed couplings and non-MFV interactions.

T 33.3 Mo 17:15 K.12.20 (K2)

$B \rightarrow \pi\pi$ form factors in QCD factorization — ●PHILIPP BÖER, THORSTEN FELDMANN, and DANNY VAN DYK — Universität Siegen

The $B \rightarrow \pi\pi$ form factors are an essential ingredient for the calculation of *e.g.* the branching fraction of $B \rightarrow \pi\pi\ell\nu$ and the three-body

decay $B \rightarrow \pi\pi\pi$. We expect these form factors to fulfill a factorization theorem as long as the dipion invariant mass is large, $k^2 \simeq m_b^2$. We explicitly check this factorization theorem by calculating the leading terms in a combined expansion in the strong coupling and powers of Λ_{QCD}/m_b .

T 33.4 Mo 17:30 K.12.20 (K2)

Synergies of the decays $B_s \rightarrow K^{*-}\ell^+\nu$ and $B \rightarrow K^*\ell^+\ell^-$ — THORSTEN FELDMANN, ●BASTIAN MÜLLER, and DANNY VAN DYK — Universität Siegen

In light of the tension between inclusive and exclusive determinations of the CKM matrix element $|V_{ub}|$, we investigate with the decay $B_s \rightarrow K^{*-}\ell^+\nu$ an interesting, independent probe of $|V_{ub}|$ in exclusive decays. We present analytic expressions for the full angular distribution of the subsequent $K^{*-} \rightarrow K^-\pi$ decay. Numerical estimates are given for a subset of observables. In addition, we combine the angular observables of the decays $B_s \rightarrow K^{*-}\ell^+\nu$ and $B \rightarrow K^*\ell^+\ell^-$ into new optimized observables, which offer the opportunity to reduce theoretical uncertainties.

T 33.5 Mo 17:45 K.12.20 (K2)

Updating the light-cone sum rules for the $B \rightarrow \pi$ form factor — SENTITEMSU IMSONG, ALEXANDER KHODJAMIRIAN, THOMAS MANNEL, and ●DANNY VAN DYK — Universität Siegen

The $B \rightarrow \pi$ vector form factor is needed for various phenomenological applications, including — but not limited to — the determination of the CKM matrix element V_{ub} , and theory predictions for the rare decay $B \rightarrow \pi\ell^+\ell^-$ in the Standard Model and beyond. We update the results for this form factor in the framework of light-cone sum rules. Our study differs from previous works by the application of a rigorous statistical treatment of parametric uncertainties, both for the form factor results as well as for their extrapolation toward large momentum transfer. We further give an outlook how the leading systematic uncertainties can be estimated.

T 33.6 Mo 18:00 K.12.20 (K2)

Estimates for the Parameters of the Heavy Quark Expansion — ●JOHANNES HEINONEN and THOMAS MANNEL — Universität Siegen

We give improved estimates for the non-perturbative parameters appearing in the heavy quark expansion for inclusive decays. While the parameters appearing in low orders of this expansion can be extracted from data, the number of parameters in higher orders proliferates strongly, making a determination of these parameters from data impossible. Thus, one has to rely on theoretical estimates which may be obtained from an insertion of intermediate states. We refine this method and attempt to estimate the uncertainties of this approach.