T 57: Flavourphysik 2 (Theorie)

Zeit: Dienstag 16:45–18:30 Raum: K.12.16 (K4)

T 57.1 Di 16:45 K.12.16 (K4)

Towards the new frontier in non-leptonic three-body B-decays — •Susanne Kränkl, Thomas Mannel, and Javier Virto — Universität Siegen

Dalitz plot analyses of non-leptonic three-body B decays such as $B \to \pi\pi\pi$, are interesting for a number of phenomenological applications like the extraction of the CKM angle α and the determination of CP asymmetries. Previous studies used explicit models for the resonant contributions of the three-body phase space. In contrast, we carry out a model-independent analysis of the $B \to \pi\pi\pi$ Dalitz plots within the framework of QCD factorization. We identify the relevant theoretical description in the different regions of the phase space and reconstruct the Dalitz plot by a merging of the descriptions in those regions. Resonant contributions and rescattering effects are part of the long distance QCD effects naturally contained in generalized form factors and 2-pion distribution amplitudes, which can be fitted to data. We present first results for the branching ratios of $\bar{B}^0 \to \pi^+\pi^-\pi^0$ to leading order in α_s and leading power in $\Lambda_{\rm QCD}/M_B$.

T 57.2 Di 17:00 K.12.16 (K4)

Inclusive Semi-tauonic B Decays to higher order in $1/m_b$ — Thomas Mannel and •Farnoush Shahriaran — University of Siegen

Starting from an Operator Product Expansion in the Heavy Quark Effective Theory we calculate the differential decay rate for inclusive $B \to X_c\tau\nu$ transitions to order $1/m_b^4$ for the unpolarized τ leptons at tree level.

T 57.3 Di 17:15 K.12.16 (K4)

Heavy Hadron Decays with Conserved Heavy Flavour — •Sven Faller and Thomas Mannel — Theoretische Physik 1, Naturwissenschaftlich-Technische Fakultät, Universität Siegen, Walter-Flex-Straße 3, D-57068 Siegen

We investigate the decays of heavy hadrons where the heavy quark acts as a spectator and the light quark decays in a weak transition. For these $s \to u$ or $d \to u$ decays we show that the decay rates can be reliably computed.

T 57.4 Di 17:30 K.12.16 (K4)

Semileptonic B **Decays into Orbitally Excited** D **Mesons** — •Rebecca Klein, Thomas Mannel, and Farnoush Shahriaran — Universität Siegen

The first orbitally excited D meson states can be arranged in two spin symmetry doublets $D^{**} = \{D_{j_{\rm light}=1/2}, D_{j_{\rm light}=3/2}\} = \{(D(0^+), D(1^+)), (D^*(1^+), D^*(2^+))\}$. The heavy quark effective theory (HQET) Hamiltonian at order $1/m_c$ induces a coupling of the heavy quark spin to the chromomagnetic field of the light degrees of freedom, which is generated by its angular momenta. This effect also leads to a mixing of the two 1^+ states, which we estimate by simple means. We discuss the effect on various processes, in particular the semileptonic decays $B \to D^{**}\ell\bar{\nu}$.

T 57.5 Di 17:45 K.12.16 (K4)

NLO corrections to power suppressed contributions to $\bar{B} \to X_c\ell\bar{\nu}$ — Thomas Mannel, Alexei A. Pivovarov, and •Denis Rosenthal — Theoretische Physik 1, Naturwissenschaftlich-Technische Fakultät, Universität Siegen, Walter-Flex-Straße 3, D-57068 Siegen, Germany

We present the results of a calculation of the perturbative QCD corrections for the semileptonic inclusive width of a heavy flavored meson. Within the Heavy Quark Expansion we analytically compute the QCD correction to the coefficient of power suppressed contribution of chromo-magnetic operator in the limit of vanishing mass of the final state quark. The important phenomenological applications are decays of bottom mesons, and to the less extent, charmed mesons.

T 57.6 Di 18:00 K.12.16 (K4)

Radiative generation of neutrino mixing: degenerate masses and threshold corrections — •Wolfgang G. Hollik — Karlsruhe Institute of Technology, Karlsruhe, Germany

Degenerate neutrino masses are excluded by experiment. The experimentally measured mass squared differences together with the yet undetermined absolute neutrino mass scale allow for a quasi-degenerate mass spectrum. For the lightest neutrino mass larger than roughly 0.1 eV, we analyse the influence of threshold corrections at the electroweak scale. We show that typical one-loop corrections can generate the observed neutrino mixing as well as the mass differences starting from exactly degenerate masses at the tree-level. Those threshold corrections have to be explicitly flavour violating. Flavour diagonal, non-universal corrections are not sufficient to simultaneously generate the correct mixing and the mass differences. We apply the new insights to an extension of the Minimal Supersymmetric Standard Model with non-minimal flavour violation in the soft breaking terms and discuss the low-energy threshold corrections to the light neutrino mass matrix in that model.

T 57.7 Di 18:15 K.12.16 (K4)

Constraining Astrophysical Neutrino Flavor Composition from Leptonic Unitarity — •Xun-Jie Xu[1,2], Hong-Jian He[2], and Werner Rodejohann[1] — [1]Max-Planck-Institut für Kernphysik, Postfach 103980, D-69029 Heidelberg, Germany — [2]Institute of Modern Physics and Center for High Energy Physics,Tsinghua University, Beijing 100084, China.

In this work, using the unitarity of leptonic mixing matrix, we derive nontrivial unitarity constraints on the flavor composition of astrophysical neutrinos detected by IceCube. Applying leptonic unitarity triangles, we deduce these unitarity bounds from geometrical conditions, such as triangular inequalities. These new bounds generally hold for three flavor neutrinos, and are independent of any experimental input or the pattern of leptonic mixing. We apply our unitarity bounds to derive general constraints on the flavor compositions for three types of astrophysical neutrino sources (and their general mixture), and compare them with the IceCube measurements.