T 14: QCD (Theorie) 4
Convenor: Steffen Schumann

Zeit: Freitag 9:30–10:30   Raum: VG 3.103

T 14.1   Fr 9:30   VG 3.103

Electric dipole transitions of heavy quarkonium — •Piotr Pietrulewicz — Universität Wien

In this talk we will present the theoretical treatment of electric dipole transitions of heavy quarkonia within an effective field theory formalism. Inside the effective field theory called potential nonrelativistic QCD (pNRQCD) we will account for the relativistic corrections to the decay rate in a systematic and model-independent way. Former results from potential model calculations will be scrutinized and a phenomenological analysis in relation to the experimental data will be presented.

T 14.2   Fr 9:45   VG 3.103

Bottom mass from Upsilon sum rules at NNLL — Andre Hoang[1], Pedro Ruiz-Femenia[2], and •Maximilian Stahlhofen[1] — [1]University of Vienna, Austria — [2]IFIC, Valencia

A new determination of the bottom quark mass from nonrelativistic (large-n) sum rules with renormalization group (RG) improvement at NNLL is presented. This method is highly competitive and we obtain a precise value for the bottom mass. The RG improvement leads to a considerable stabilization of the result for the bottom mass with respect to renormalization and factorization scale dependence com- pared to previous fixed order results.

T 14.3   Fr 10:00   VG 3.103

NLL stop-antistop production at threshold for unstable squarks — •Peter Poier, Pedro Ruiz Femenia, and Andre Hoang — Universität Wien, Wien, Österreich

We study the cross section for stop-antistop-squark pair production in the electron-positron collision close to threshold for unstable squarks. Scales appearing in this process are the mass of the stop-squarks m, their 3-momentum $\sim mv$ and their kinetic energy $\sim mv^2$, where v is the relative velocity of the squarks in the c.m. frame. Close to production threshold ($v \ll 1$) we need to resum terms $\sim (\alpha_s/v)^n$ as well as large logarithms of ratios of the physical scales in quantum corrections to the cross section. To achieve this we employ the scalar version of the effective field theory framework vNRQCD. The finite width Γ, which we count as $O(mv^2)$, is an additional scale in the problem. Stop quark instability effects generate divergences in the phase space integrals and to deal with these in the effective theory kinematic cuts on the final states are introduced. Finite lifetime and background effects already enter at leading order and are substantially more important than for top quark production.

T 14.4   Fr 10:15   VG 3.103

NNLL top-antitop production close to threshold — Andre Hoang[1], Pedro Ruiz-Femenia[2], and •Maximilian Stahlhofen[1] — [1]University of Vienna, Austria — [2]IFIC, Valencia

We use the effective field theory framework vNRQCD to describe the resonance line-shape of top-antitop-quark production in electron-positron collisions. The process is governed by three different scales: the mass of the top quarks m, their 3-momentom $\sim mv$ and their kinetic energy $\sim mv^2$, where v is the relative velocity of the quarks. Close to the production threshold this velocity is very small ($v \ll 1$) and leads to large terms $\sim (\alpha_s/v)^n$ and large logarithms of the ratios of the physical scales in quantum corrections to the total cross section. The effective theory vNRQCD allows for a systematic resummation of these terms employing a Schrödinger equation and a renormalization group with a "subtraction velocity" as scaling parameter, respectively. We will discuss recent improvements in the theoretical prediction of the top-antitop resonance cross section and present the latest result at NNLL.