

**Extraction of the strong coupling constant α_s
from radiative decays of heavy quark bound
states**

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The way how we determine the coupling constant of the strong interactions (denoted as α_s) from radiative decays (i.e. decays containing a photon) of bound states of heavy quarks will be explained. α_s is one of the parameters of the Standard Model of particle physics and a precise and accurate determination of its value (from many different and independent processes) is a necessary and important issue.

The talk will consist of a first introductory part, where the basic concepts about the Standard Model of particle physics, and in particular the theory of the strong

interactions (Quantum ChromoDynamics) and its coupling constant α_s , will be quickly overviewed. After that the techniques that allow us to extract α_s from decays of heavy quark bound states will be mentioned, and the actual extraction will be explained.

The α_s extraction we have performed employs experimental data for the decays of the Υ meson (a bound state of a b quark and a \bar{b} antiquark). In particular we have utilized the so-called R_γ ratio, which is the ratio of the number of events in the $\Upsilon \rightarrow gg\gamma$ decay over the number of events in the $\Upsilon \rightarrow ggg$ decay (γ denotes a photon and g a gluon, which is the analog of the photon for the strong interactions). The analysis leads to the following value for α_s

$$\alpha_s(M_Z) = 0.119_{-0.005}^{+0.006}, \quad (1)$$

which, as it will be shown in the talk, is in good agreement with other determinations coming from very different physical processes (performed by several different people over the years).