$\boldsymbol{\alpha_s}$ and $\boldsymbol{R(s)}$

- α_s : one of the fundamental constants of Nature

- its precise value at various scales is of great importance for testing QCD, the SM and beyond (Grand Unified Theories)

- "gold-plated" α_s determinations: $\boldsymbol{R(s)}$ (or its variants like the Z-boson decay rate into hadrons or the semileptonic branching ratio of the τ-lepton into hadrons)

- Nontrivial QCD effects in these observables start at order $\boldsymbol{\alpha_s}^2$ (computed 23 years ago /K.Ch., A.Kataev, F, Tkachov(79)/.

The next, $\boldsymbol{\alpha_s}^3$ order was correctly computed only 12(!) years later in **two** (but not really independent!) works /S.Gorishny, A.Kataev, S.Larin (91) and L.Surguladze,M.Samuel (91) in a **fixed** (Feynman) gauge/ and then finally confirmed by a completely independent reevaluation in **general** covariant gauge / K.Ch. 1996/

- an enormous reduction of the experimental uncertainty (down to 3%) has been achieved during the past years (in particular through the analysis of Z decays and of τ decays at **LEP** with the perspective of a further reduction by a factor of four at a future linear collider (**TESLA**)
- a theoretical error from unknown higher orders is at present comparable to the experimental one $\longrightarrow$ numerous "estimations" of the $\mathcal{O}(\boldsymbol{\alpha_s}^4)$ terms

- **"real" calculation is on agenda**