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The strong coupling from e^+e^- to hadrons

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We determine the strong coupling, α_s , using finite-energy sum rules and a new compilation of the hadronic R -ratio from available data for $e^+e^- \rightarrow$ hadrons below the charm threshold. Quoting our final results at the tau mass to facilitate comparison to the results of analyses of hadronic tau decay data, we find

$\alpha_s(m_\tau^2) = 0.298 \pm 0.017$ in fixed-order perturbation theory and $\alpha_s(m_\tau^2) = 0.304 \pm 0.019$ in contour-improved perturbation theory, where the quoted errors are largely dominated by statistics. At the Z boson mass, we find $\alpha_s(m_Z^2) = 0.1158 \pm 0.0022$ and $\alpha_s(m_Z^2) = 0.1166 \pm 0.025$, respectively. Our results are in agreement with the world average and with recent extractions from tau decay data. Our method provides an independent and competitive strategy for the extraction of the strong coupling below the charm threshold.

Primary authors: BOITO, Diogo (Universidade de São Paulo); GOLTERMAN, Maarten (San Francisco State University); KESHAVARZI, Alexander; MALTMAN, Kim (York University); NOMURA, Daisuke; TEUBNER, Thomas (University of Liverpool); PERIS, santiago (Univ. Autonoma de Barcelona)

Presenter: BOITO, Diogo (Universidade de São Paulo)

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