Plots of cross sections and related quantities (p.358)

\( \sigma \) and \( R \) in \( e^+e^- \) Collisions

Figure 40.6: World data on the total cross section of \( e^+e^- \rightarrow \text{hadrons} \) and the ratio \( R(s) = \sigma(e^+e^- \rightarrow \text{hadrons}, s)/\sigma(e^+e^- \rightarrow \mu^+\mu^-, s) \). \( \sigma(e^+e^- \rightarrow \text{hadrons}, s) \) is the experimental cross section corrected for initial state radiation and electron-positron vertex loops, \( \sigma(e^+e^- \rightarrow \mu^+\mu^-, s) = 4\pi\alpha^2(s)/3s \). Data errors are total below 2 GeV and statistical above 2 GeV. The curves are an educative guide: the broken one (green) is a naive quark-parton model prediction, and the solid one (red) is 3-loop pQCD prediction (see “Quantum Chromodynamics” section of this Review, Eq. (9.12) or, for more details, K. G. Chetyrkin et al., Nucl. Phys. B586, 56 (2000) (Erratum \textit{ibid.} B634, 413 (2002)). Breit-Wigner parameterizations of \( J/\psi, \psi(2S) \), and \( \Upsilon(nS), n = 1, 2, 3, 4 \) are also shown. The full list of references to the original data and the details of the \( R \) ratio extraction from them can be found in \texttt{arXiv:hep-ph/0312114}. Corresponding computer-readable data files are available at \texttt{http://pdg.lbl.gov/current/xsect/}. (Courtesy of the COMPAS (Protvino) and HEPDATA (Durham) Groups, August 2007. Corrections by P. Janot (CERN) and M. Schmitt (Northwestern U.))