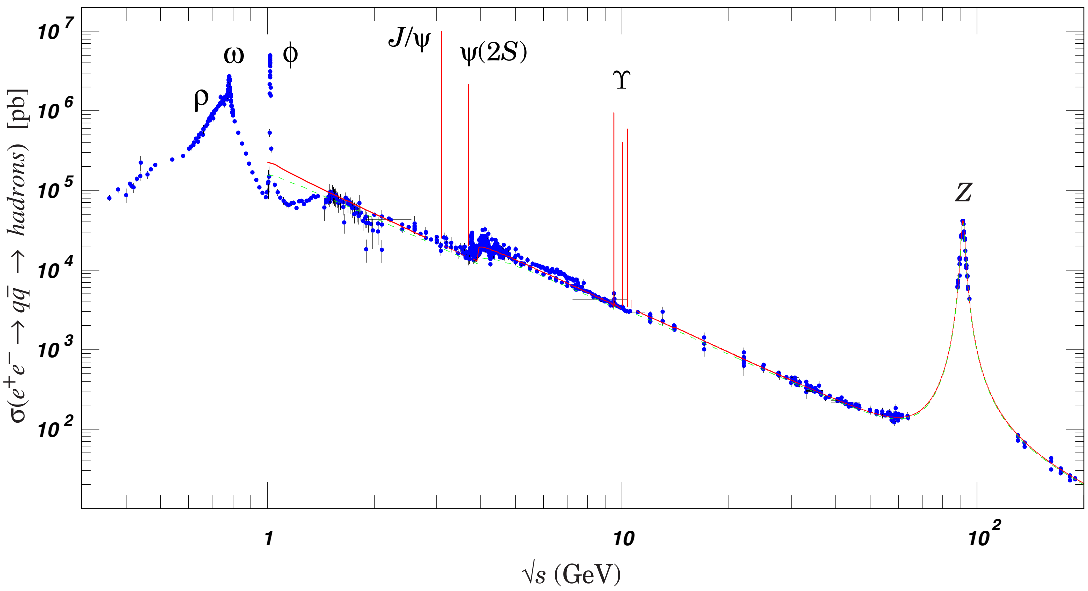
σ and R in e^+e^- Collisions



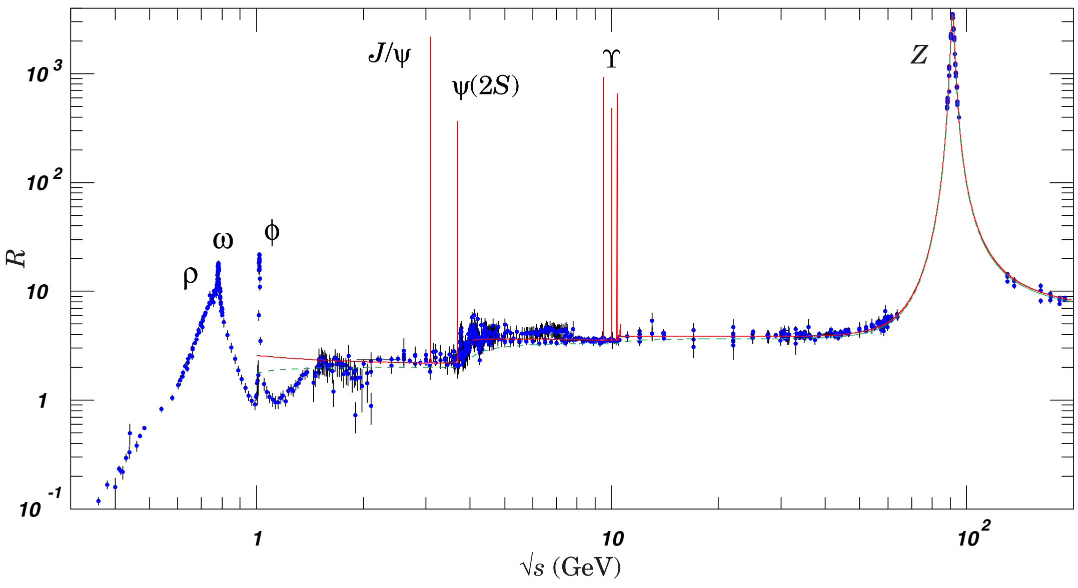


Figure 39.6, Figure 39.7: World data on the total cross section of $e^+e^- \to hadrons$ and the ratio $R = \sigma(e^+e^- \to hadrons)/\sigma(e^+e^- \to \mu^+\mu^-$, QED simple pole). The curves are an educative guide. The solid curves are the 3-loop pQCD predictions for $\sigma(e^+e^- \to hadrons)$ and the R ratio, respectively [see our Review on Quantum chromodynamics, Eq. (9.12)] or, for more details, K.G. Chetyrkin *et al.*, Nucl. Phys. **B586**, 56 (2000), Eqs. (1)–(3)). Breit-Wigner parameterizations of J/ψ, $\psi(2S)$, and $\Upsilon(nS), n = 1..4$ are also shown. **Note:** The experimental shapes of these resonances are dominated by the machine energy spread and are not shown. The dashed curves are the naive quark parton model predictions for σ and R. The full list of references, as well as the details of R ratio extraction from the original data, can be found in O.V. Zenin *et al.*, `hep-ph/0110176` (to be published in J. Phys. **G**). Corresponding computer-readable data files are available at `http://wwwppds.ihep.su/≈zenin_o/contents_plots.html`. (Courtesy of the COMPAS (Protvino) and HEPDATA (Durham) Groups, November 2001.)