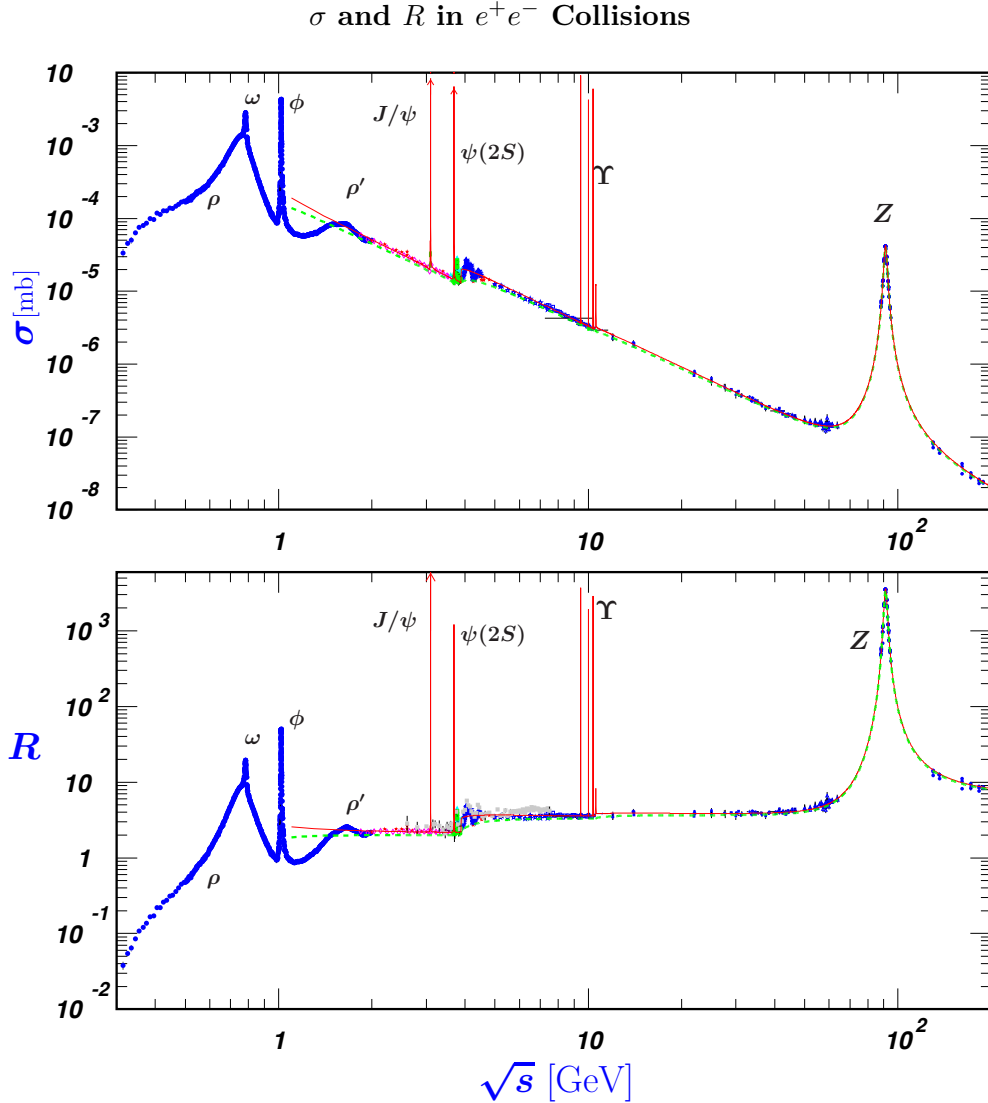## 51.3 σ and R in e^+e^- Collisions

Revised August 2019 by V.I. Belousov (COMPAS Group, IHEP), V.V. Ezhela (COMPAS Group, IHEP), A.A. Godizov (COMPAS Group, IHEP), V.A. Petrov (COMPAS Group, IHEP), R.A. Ryutin (COMPAS Group, IHEP), N.P. Tkachenko (COMPAS Group, IHEP) and O.V. Zenin (COMPAS Group, IHEP; MIPT Moscow).

σ **and** R **in** e^+e^- **Collisions**

Figure 51.2: World data on the total cross section of $e^+e^- \to hadrons$ and the ratio $R(s) = \sigma(e^+e^- \to hadrons, s)/\sigma(e^+e^- \to \mu^+\mu^-, s)$. $\sigma(e^+e^- \to hadrons, s)$ is the experimental cross section corrected for initial state radiation and electron-positron vertex loops, $\sigma(e^+e^- \to \mu^+\mu^-, s) = 4\pi\alpha^2(s)/3s$. 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. (9.7) or, for more details [99], Breit-Wigner parameterizations of J/ψ, $\psi(2S)$, 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 [100]. Corresponding computer-readable data files are available at http://pdg.lbl.gov/current/xsect/. (Courtesy of the COMPAS (Protvino) and HEPDATA (Durham) Groups, August 2019. Corrections by P. Janot (CERN) and M. Schmitt (Northwestern U.))

R in Light-Flavor, Charm, and Beauty Threshold Regions
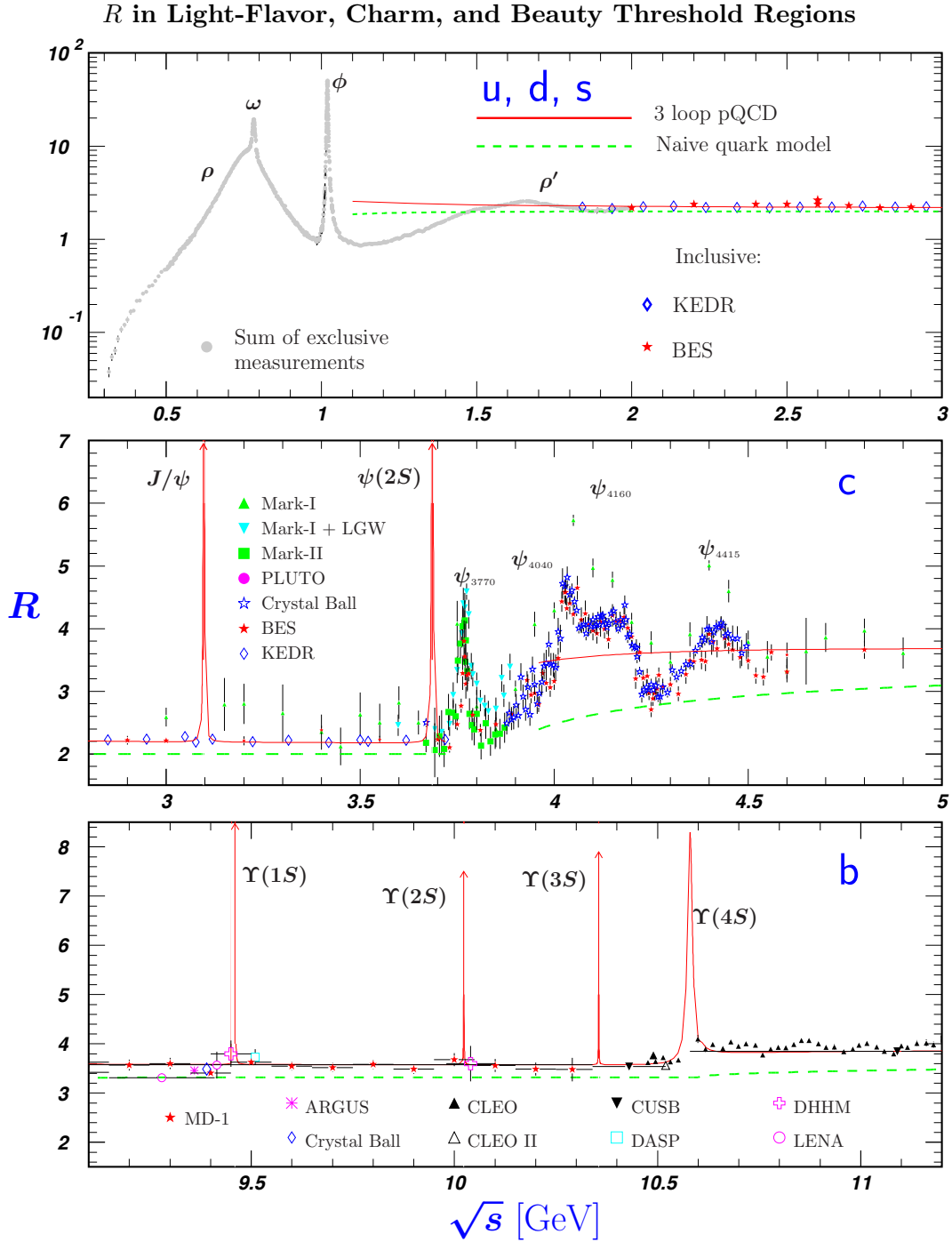
Figure 51.3: R in the light-flavor, charm, and beauty threshold regions. Data errors are total below 2 GeV and statistical above 2 GeV. The curves are the same as in Fig. 51.2. **Note:** CLEO data above $\Upsilon(4S)$ were not fully corrected for radiative effects, and we retain them on the plot only for illustrative purposes with a normalization factor of 0.8. The full list of references to the original data and the details of the R ratio extraction from them can be found in [100]. The computer-readable data are available at http://pdg.lbl.gov/current/xsect/. (Courtesy of the COMPAS (Protvino) and HEPDATA (Durham) Groups, August 2019.)