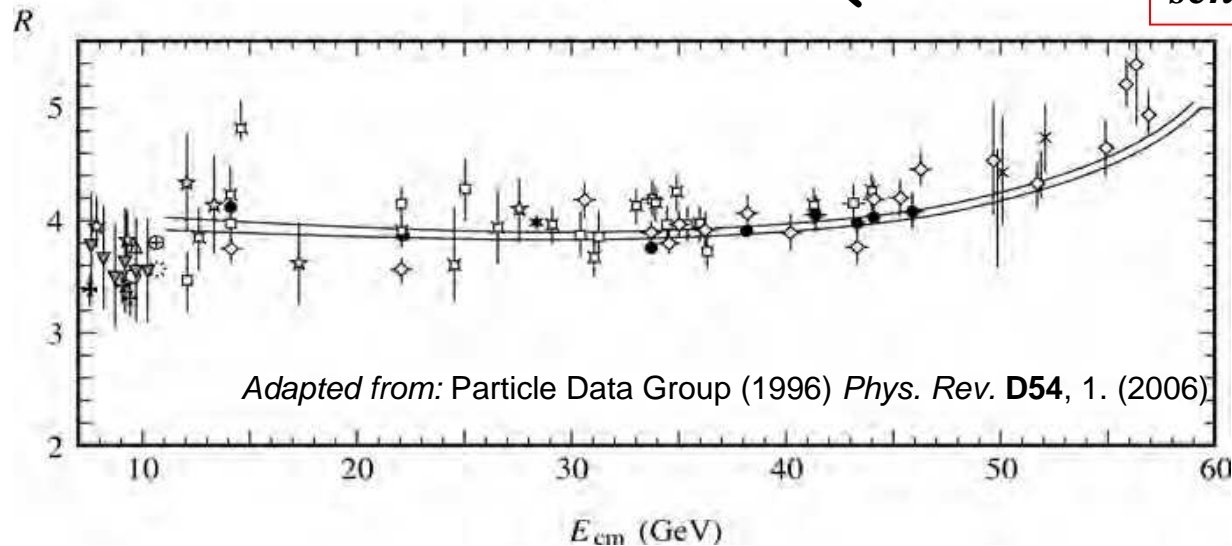


Due Date: 10-01-08

Nuclear Physics 621

Send your answer to:
Nicolas Schunck,
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Homework 2 - QCD



The quantity R depicted in the figure is the ratio between the cross-sections of 2 different sorts of processes involving e^- and e^+ interacting via electromagnetic interaction:

$$R = \frac{\sigma(e^+e^- \rightarrow q\bar{q})}{\sigma(e^+e^- \rightarrow \mu^+\mu^-)}$$

- 1) Considering the energy range in the figure, what types of quarks can be produced in the reaction?
- 2) It can be shown that the ratio R is directly proportional to the sum of the squares of the quark electric charges:

$$R \sim \sum e_{quarks}^2$$

Find the theoretical value of R based on what you know of quarks and basic QCD. Compare with the experimental value in the figure.