

12. Übungsblatt
Theoretische Physik 6: WS2014/15
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Exercise 1 (50 points): Electron-positron annihilation into a scalar quark-antiquark pair $e^+e^- \rightarrow q\bar{q}$

Consider electron-positron annihilation into a quark-antiquark pair $e^+(k_2)e^-(k_1) \rightarrow q(p_2)\bar{q}(p_1)$. Treat the electron as a massless Dirac particle and the quark as a massive Klein-Gordon particle. Derive the differential cross section in the center of mass frame.

Exercise 2 (50 points): Electron-positron annihilation: $e^+e^- \rightarrow \mu^+\mu^-$

Consider electron-positron annihilation into a muon-antimuon pair $e^+(k_2)e^-(k_1) \rightarrow \mu^+(p_2)\mu^-(p_1)$. Treat the electron as a massless and the muon as a massive Dirac particles. Derive the differential cross section in the center of mass frame.