QCD and Monte Carlos

University Antwerp 2015

Exercises for Lecture 3 (28. Oct 2015)

continue with exercises from Lecture 2

12. Calculate the Sudakov form factor for the scales $t_2 = 10, 100, 500$ GeV^2 as a function of t_1 and plot it as a function of t_1. Note that $t = q^2$. Use both q and $q(1-z)$ as the argument for α_s, and check the differences. For the z integral use $z_{min} = 0.01$ and $z_{max} = 0.99$.

$$\log \Delta_S = -\int_{t_1}^{t_2} \frac{dt}{t} \int_{z_{min}}^{z_{max}} dz \frac{\alpha_s}{2\pi} P(z)$$

Use the gluon and also the quark splitting functions :

$$P_{gg} = 6\left(\frac{1-z}{z} + \frac{z}{1-z} + z(1-z)\right)$$

and

$$P_{qq} = \frac{4}{3}\frac{1+z^2}{1-z}$$