QCD and Monte Carlos

University Antwerp 2015

Exercises for Lecture 4 (29. Oct 2015)

continue with exercises from Lecture 3

13. write a program to evolve a gluon density $g(x) = 3(1-x)^5/x$ from a starting scale $t_0 = 1$ GeV^2 to and higher scale $t = 100$ GeV^2. At the starting scale the partons can have a intrinsic k_t, which is generated by a gauss distribution with $\mu = 0$ and $\sigma = 0.7$. Do the evolution only with fixed $\alpha_s = 0.1$ and an approximate gluon splitting function $P_{gg} = 6(\frac{1}{z} + \frac{1}{1-z})$. To avoid the divergent regions use $z_{min} = \epsilon$ and $z_{max} = 1 - \epsilon$ with $\epsilon = 0.1$. Calculate the Sudakov form factor for evolving from t_1 to t_2 using only the $\frac{1}{(1-z)}$ part of the splitting function. Generate z according to $6\frac{\alpha_s}{2\pi}(\frac{1}{z} + \frac{1}{1-z})$. Repeat the branching until you reach the scale t.

    Plot the $xg(x)$ as a function of x for the starting distribution and for the evolved distribution. Overlay the 2 plots. Use for the overlays the macro: `macros_evolve.C`

    Repeat the same exercise but with $P_{qq} = \frac{4}{3}\frac{1+z^2}{1-z}$.