The program takes as input Amax (the number of gluons), and Ntraj. Given Amax, it calculates all possible random walks of length $\leq$ Amax (CalcPQCount). Then for each of a set of values of y, it does the following:

1. Generate Ntraj*10 trajectories by selecting each step weighted by its degeneracy given that the walk must return to (0,0) (FindTrajectory). Each trajectory is also associated with a random placement of gluons in rapidity space between -7 and 7.

2. For each random walk, calculate the quadratic Casimir at each step and use this to find the energy density:

$$\begin{aligned}\epsilon = \frac{dE}{dy} &= \frac{1}{\sqrt{2\pi}\sigma}\int_{-\infty}^{\infty} d\eta \frac{dE}{d\eta} e^{-(\eta-y)^2/2\sigma^2} \\ &= \frac{1}{2}\sum_a \frac{dE}{d\eta}\Big|_{\eta=\eta(a)} \left[\operatorname{erf}\left(\frac{\eta(a+1)-y}{\sqrt{2}\sigma}\right) - \operatorname{erf}\left(\frac{\eta(a)-y}{\sqrt{2}\sigma}\right)\right].\end{aligned}$$

   We assume that

$$\frac{dE}{d\eta} \propto C(a),$$

   therefore in this program we assume the constant of proportionality is 1. All moments are then off by a scalar multiple.

3. Average over all trajectories (which are split into 10 samples to estimate error) to find $\langle \epsilon^n \rangle$, and therefore the cumulant ratios $\omega, S\sigma, K\sigma^2$.

4. Write the ratios to an output file (moments.dat), which can be used with moments.py, ratios.py, and altratios.py to graph cumulants and their ratios over y.