

## A Monte Carlo Simulation of Particle Decay

During an experiment, a beam of 10,000 B+ particles with lifetime of  $1.638 \times 10^{-12}$  and mass 5.279 GeV start at  $x=0$  and are travel in the +x-direction with momenta uniformly distributed between 10 and 20 GeV.

- Write a simple Monte Carlo to simulate the decays in this experiment.
- Make a 1 dimensional histogram of the number of particles that decay a function of  $x$  for  $x$  between 0 and 1 cm
- Make a profile plot of the mean decay distance as a function of B+ momentum (a profile plot gives the average value of one variable as a function of another). Do *not* impose the 1 cm maximum distance from part (b) for this plot.