**Simulations:**

Simulate velocity jump process with 1000 particles

Particles initially move to left or right with speed *s*=10; *p* is the probability that a particle will initially move to the left

Particles switch direction with rate λ

Record position of each particle every 1 time unit for 10 time units

Use histograms of particle positions as “feature vectors” for DMAPS

Do DMAPS on raw histograms

Do DMAPS on scattering transform of histograms

Expect data to be two-dimensional (one dimension for time, one dimension for initial probability *p*)

* At low λ (λ =10), the initial left-right probability *p* dominates the dynamics of the simulations; DMPAS should show a 1D embedding correlated with *p*
* At intermediate λ (λ =100), DMAPS should show a 2D embedding correlated with *p* and time
* At large λ (λ =1000), the left-right jumpers are quickly equilibrated; DMAPS should show a 1D embedding correlated with time

We will see that DMAPS can uncover these dynamics from the scattering transform of the histograms, but not directly from the raw histograms

**λ=10**

Histograms of particle positions (each curve is a different timepoint)



DMAPS embeddings using raw histograms:



DMAPS embeddings using scattering transform of histograms:



**λ=100**

Histograms of particle positions (each curve is a different timepoint)



DMAPS embeddings using raw histograms:



DMAPS embeddings using scattering transform of histograms:



**λ=1000**

Histograms of particle positions (each curve is a different timepoint)



DMAPS embeddings using raw histograms:



DMAPS embeddings using scattering transform of histograms:

