Task 2: Ideal Pendulum
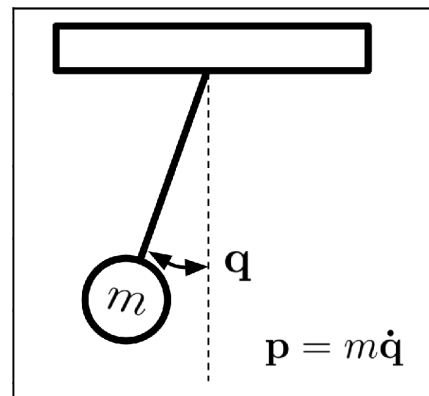
Hamiltonian

$$\mathcal{H} = 2mgl(1 - \cos q)$$

$$+ \frac{l^2 p^2}{2m}$$

Ideal pendulum

$\mathbf{q}$

m

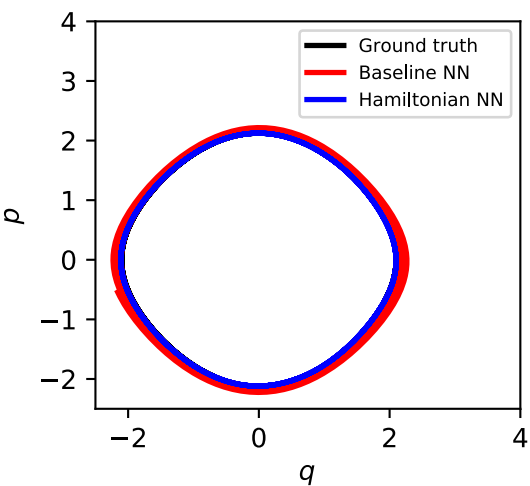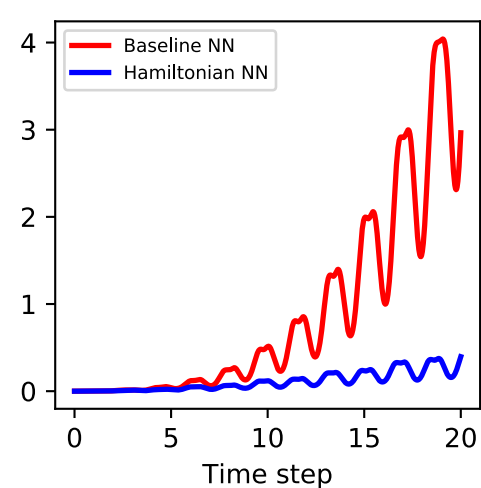$\mathbf{p} = m\dot{\mathbf{q}}$

Noisy observations
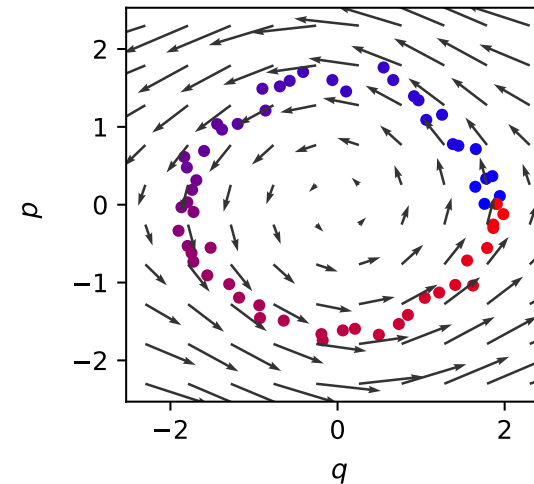
Training settings

- 25 trajectories of 30 observations each
- Adam with 10^{-3} learn rate
- 3 layers of 200 units
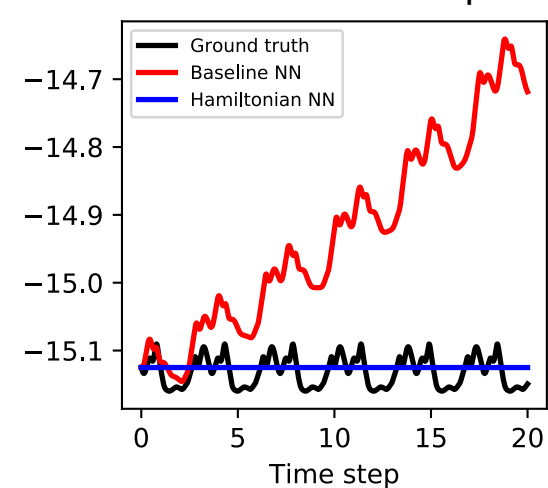- 2000 gradient steps
- `tanh` activations

Predictions

Ground truth
Baseline NN
Hamiltonian NN

MSE between coordinates

Baseline NN
Hamiltonian NN

Total HNN-conserved quantity

Ground truth
Baseline NN
Hamiltonian NN

Total energy

Ground truth
Baseline NN
Hamiltonian NN