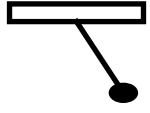
Hamiltonian system

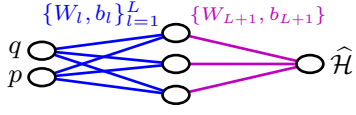


$$\mathcal{H}(q,p) = p^2/2 + (1-\cos(q))$$

$$\mathcal{D} = \{q_i, p_i, \dot{q}_i, \dot{p}_i\}_{i=0}^{K}$$

Initial approximation

$$\widehat{\mathcal{H}}(q,p) = W_{L+1}\Phi^{(L)}(q,p) + b_{L+1}$$

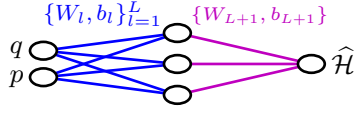


$\{W_l, b_l\}_{l=1}^{L}$ are sampled (unsupervised)

$\{W_{L+1}, b_{L+1}\} = \arg\min \mathcal{L}(\nabla\Phi^{(L)}, \dot{q}, \dot{p})$

Resample using $\widehat{\mathcal{H}}(q,p)$

$$W_{L+1}\Phi^{(L)}(q,p) + b_{L+1} \approx \mathcal{H}(q,p)$$



$\{W_l, b_l\}_{l=1}^{L}$ are SWIM-sampled

$\{W_{L+1}, b_{L+1}\} = \arg\min \mathcal{L}(\nabla\Phi^{(L)}, \dot{q}, \dot{p})$