Generative models and Variational Autoencoders (Part 2)
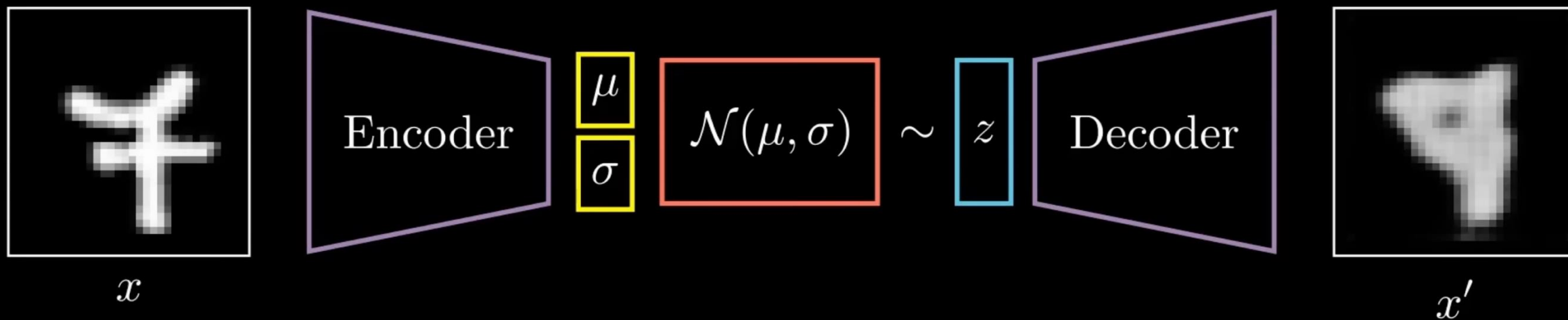
Shuwen Yue

Assistant Professor, Cornell University
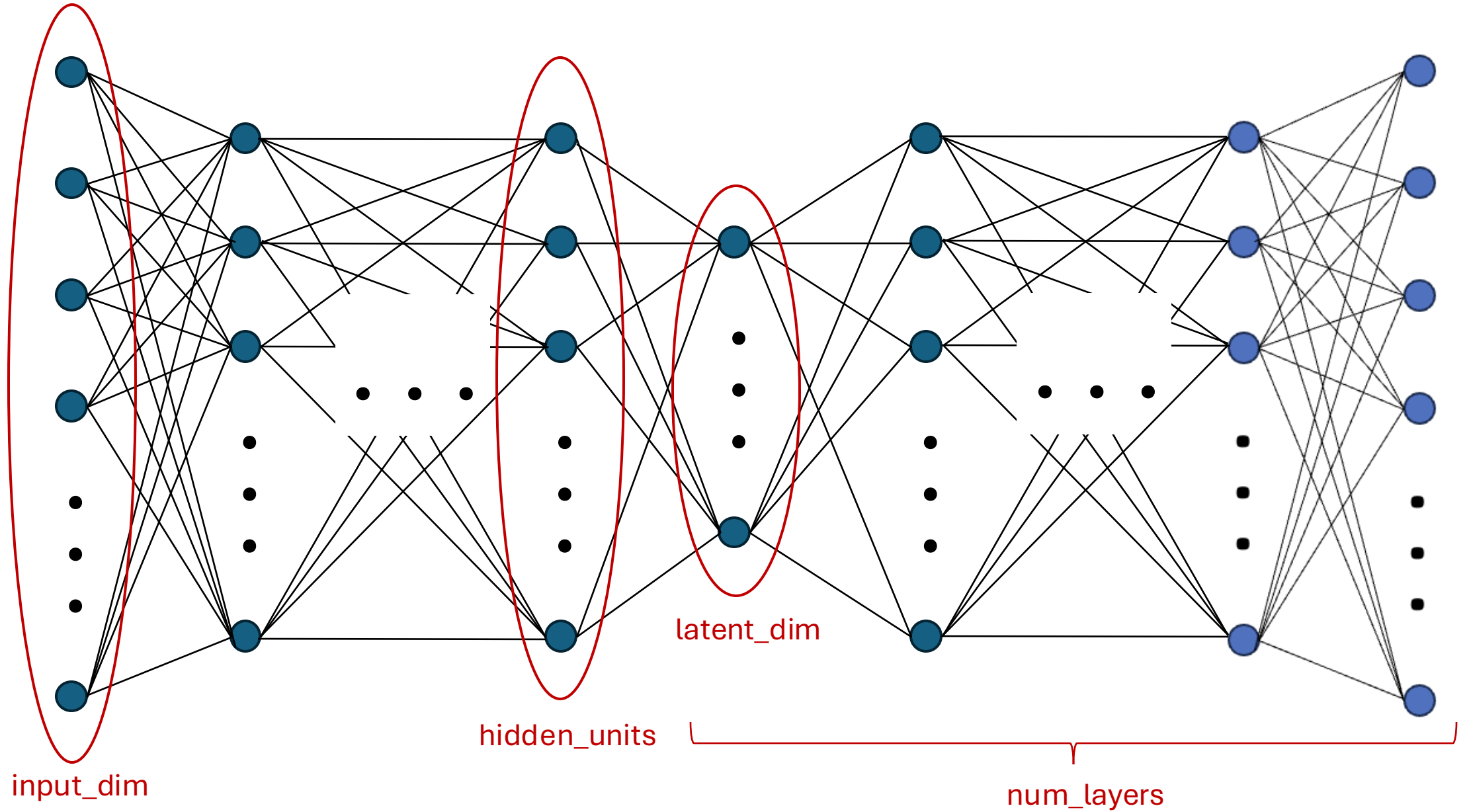
May 2, 2025

$$\mathcal{L} = \boxed{\mathcal{L}_{KL}(\mathcal{N}(\mu, \sigma) \mid \mathcal{N}(0, 1))} + \mathcal{L}_2(x, x')$$
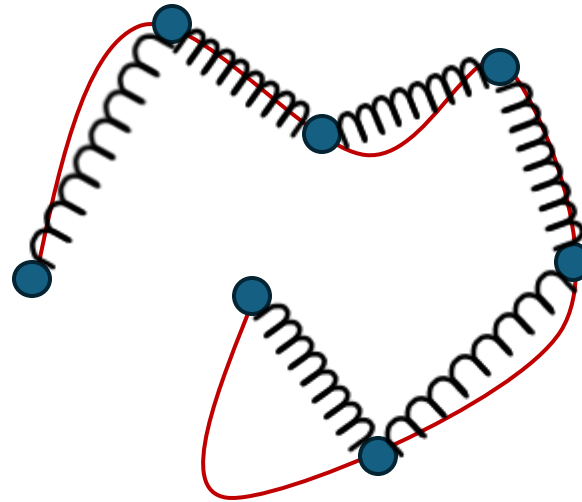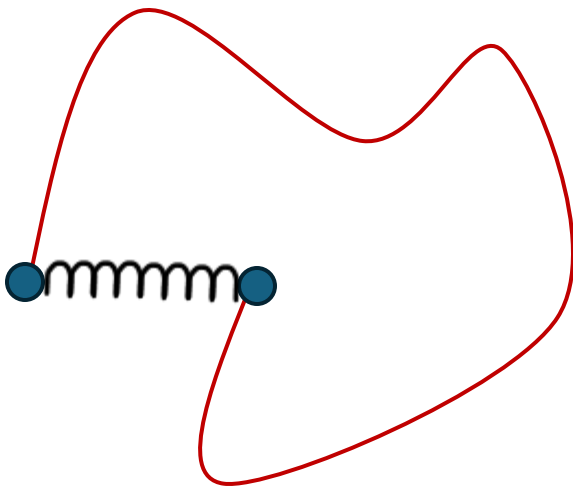
$$\mathcal{L}_{KL} = -\frac{1}{2}(1 + \log(\sigma^2) - \mu^2 - \sigma^2)$$
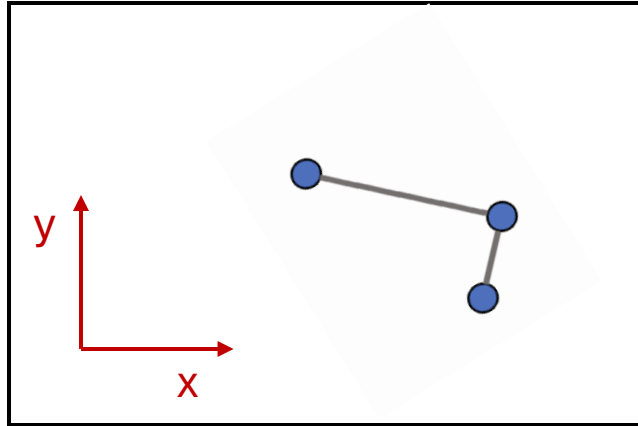
VAE Schematic

Bead-Spring Polymer Model

- Used to simulate polymer dynamics
    - Approximate distance between ends of a polymer as springs
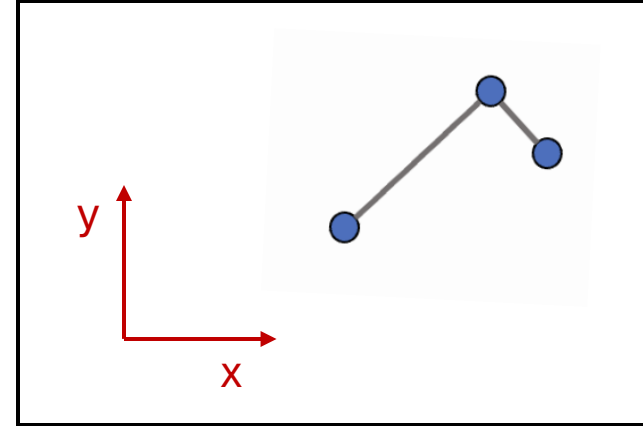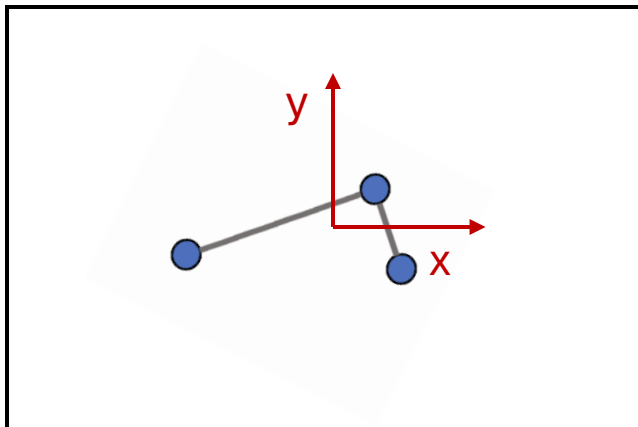   - Model larger polymer as sequence of smaller polymers which individually act as springs

Translation and Rotation Invariance:

Rotating/translating data should not affect predictions: