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SLIM ML4Seismic

Sampling

from the *posterior* distribution

After training on *in silico* pairs:

$$\{(\mathbf{x}^{(m)}, \bar{\mathbf{y}}^{(m)})\}_{m=1}^{M}$$

posterior samples conditioned on *summarized* field data $\bar{\mathbf{y}}^{\mathrm{o}}$ are drawn via

$$\mathbf{x} \sim p_{\hat{\phi}}^{-1}\left(\mathbf{x} \mid \bar{\mathbf{y}} = \bar{\mathbf{y}}^{\mathrm{o}}\right) \iff \mathbf{x} = f_{\hat{\phi}}^{-1}(\mathbf{z}; \bar{\mathbf{y}}^{\mathrm{o}}) \quad \text{with} \quad \mathbf{z} \sim N(\mathbf{0}, \mathbf{I})$$

- CNF is *amortized*
- training *marginalizes* forward KL divergence $\mathbb{E}_{\mathbf{y}\sim p(\mathbf{y})}\Big[\mathbb{KL}\left(p(\mathbf{x} \mid \mathbf{y}) \,||\, p_{\phi}(\mathbf{x})\right)\Big]$

Dynamic simulation-based inference