Algorithm 2: Model selection

Input: *data train:* $\mathbf{P}^{\text{Train}} \in \mathbb{R}^{d \times T^{\text{Train}}}$,

data test: $\mathbf{P}^{\text{Test}} \in \mathbb{R}^{d \times T^{\text{Test}}}$,

number of atoms: $K \in \mathbb{N}_0$,

lambda: $\lambda \geq 0$

Output: *reconstruction error:* $\mathcal{E}$

1 $\mathbf{D}^{\text{Train}}, \mathbf{A}^{\text{Train}}, \mathbf{W}^{\text{Train}} \leftarrow DL(\mathbf{P}^{\text{Train}}, K, \lambda, 500)$

2 $\mathbf{A}^{\text{Test}} \leftarrow \text{Proj}_{\mathbf{D}^{\text{Train}}}\left(\mathbf{P}^{\text{Test}}\right)$

3 $A_{k,t}^{\text{Pred}} \leftarrow A_{k,t}^{\text{Test}} W_k^{\text{Train}} + \mu_k + \varepsilon_k^t$ with

$$\mu_k = \bar{\alpha}_k^{\text{Train}} / (1 - W_k^{\text{Train}}),$$

$$\varepsilon_k^t \sim \mathcal{N}\left(0, \hat{\sigma}_k^2\right),$$

$$\hat{\sigma}_k^2 \leftarrow \widehat{\text{Var}}[\boldsymbol{\alpha}_k^{\text{Train}}]\left(1 - (W_k^{\text{Train}})^2\right)$$

for all $k = 1, \ldots, K$ and $t = 1, \ldots, T^{\text{Test}} - 1$

4 $\mathbf{P}^{\text{Pred}} \leftarrow \mathbf{D}^{\text{Train}}\mathbf{A}^{\text{Pred}}$

5 $\mathcal{E} \leftarrow \left\|\mathbf{P}_{:,1:}^{\text{Test}} - \mathbf{P}^{\text{Pred}}\right\|_F^2$ # without the first test value