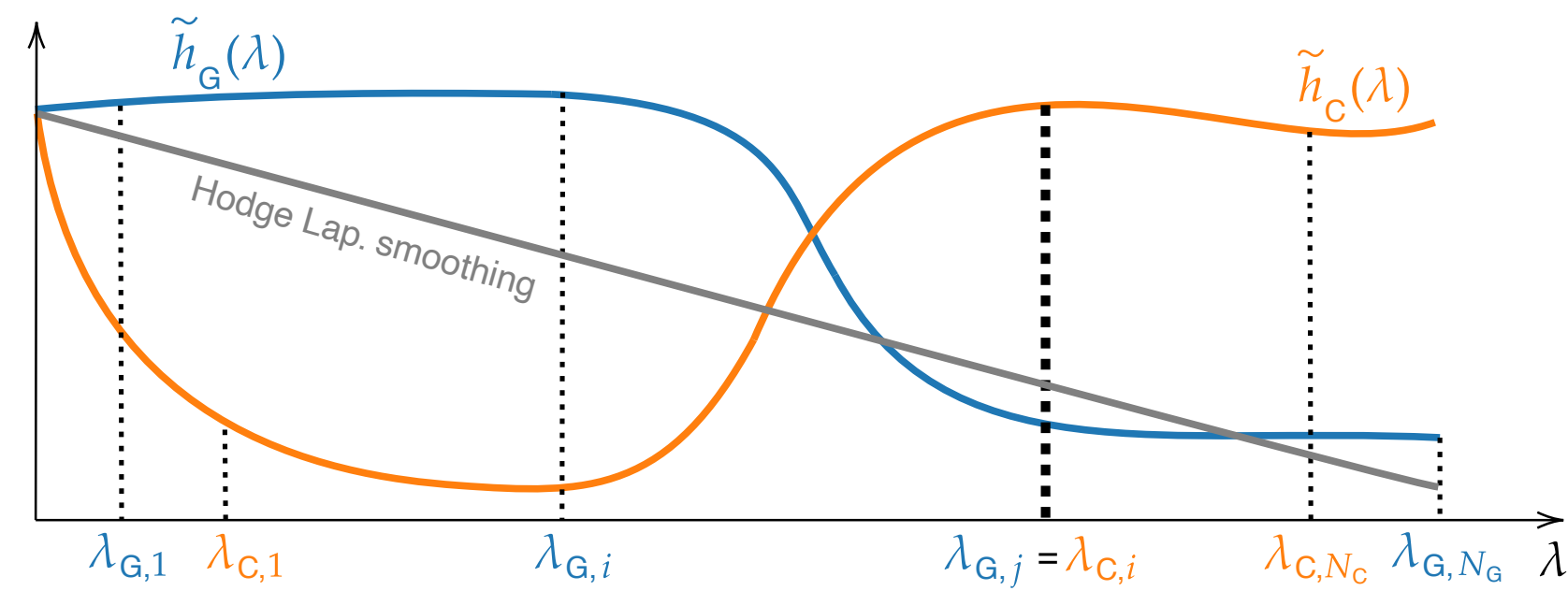# 2. Simplicial (Complex) Convolutional NNs

Simplicial CNNs

Linear

$$\mathbf{H} := \mathbf{H}(\mathbf{L}_{\mathrm{d}}, \mathbf{L}_{\mathrm{u}}; \boldsymbol{\alpha}, \boldsymbol{\beta}) = \sum_{k=0}^{K_{\mathrm{d}}} \alpha_k \mathbf{L}_{\mathrm{d}}^k + \sum_{k=0}^{K_{\mathrm{u}}} \beta_k \mathbf{L}_{\mathrm{u}}^k$$

Non-Linear