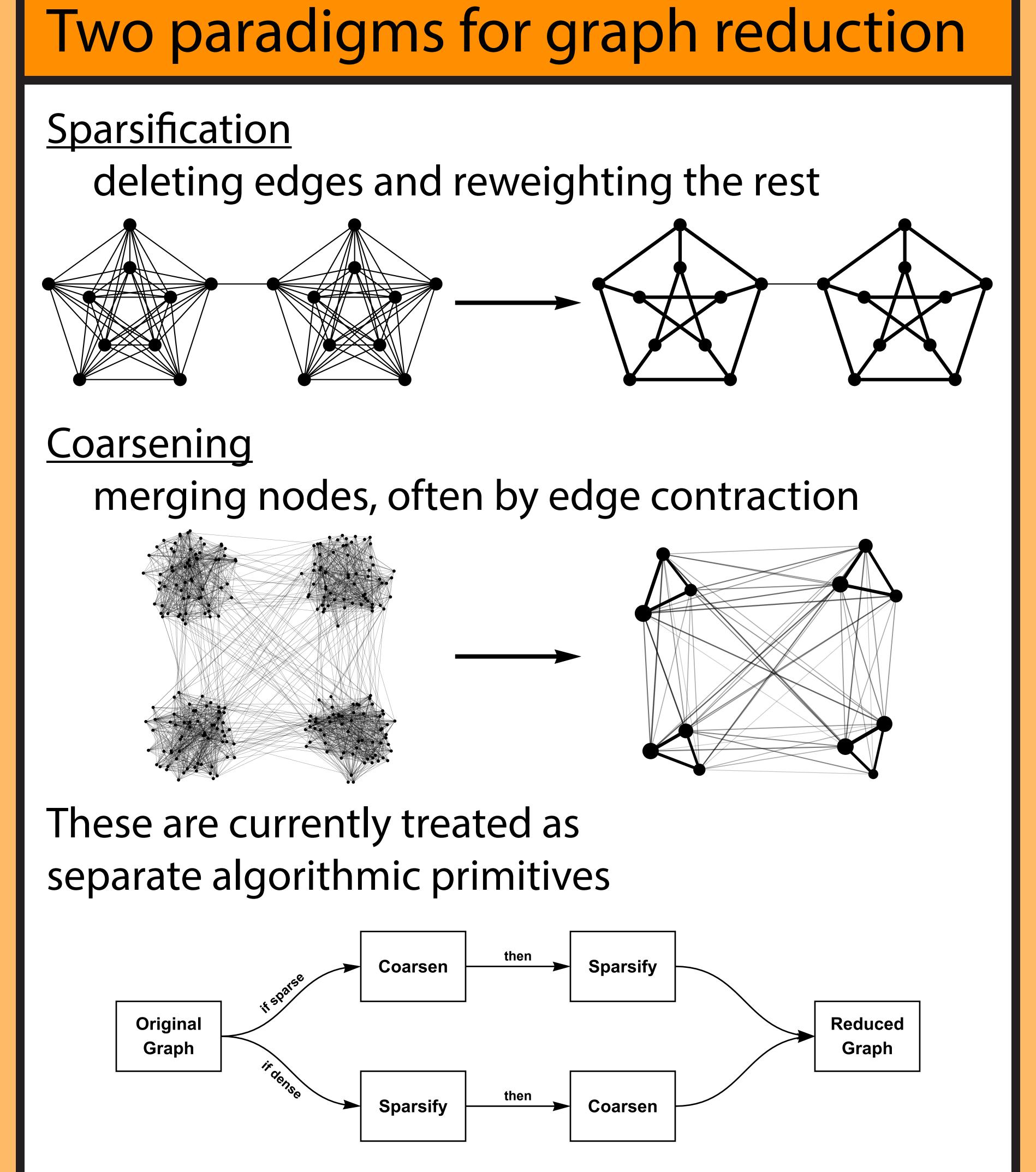
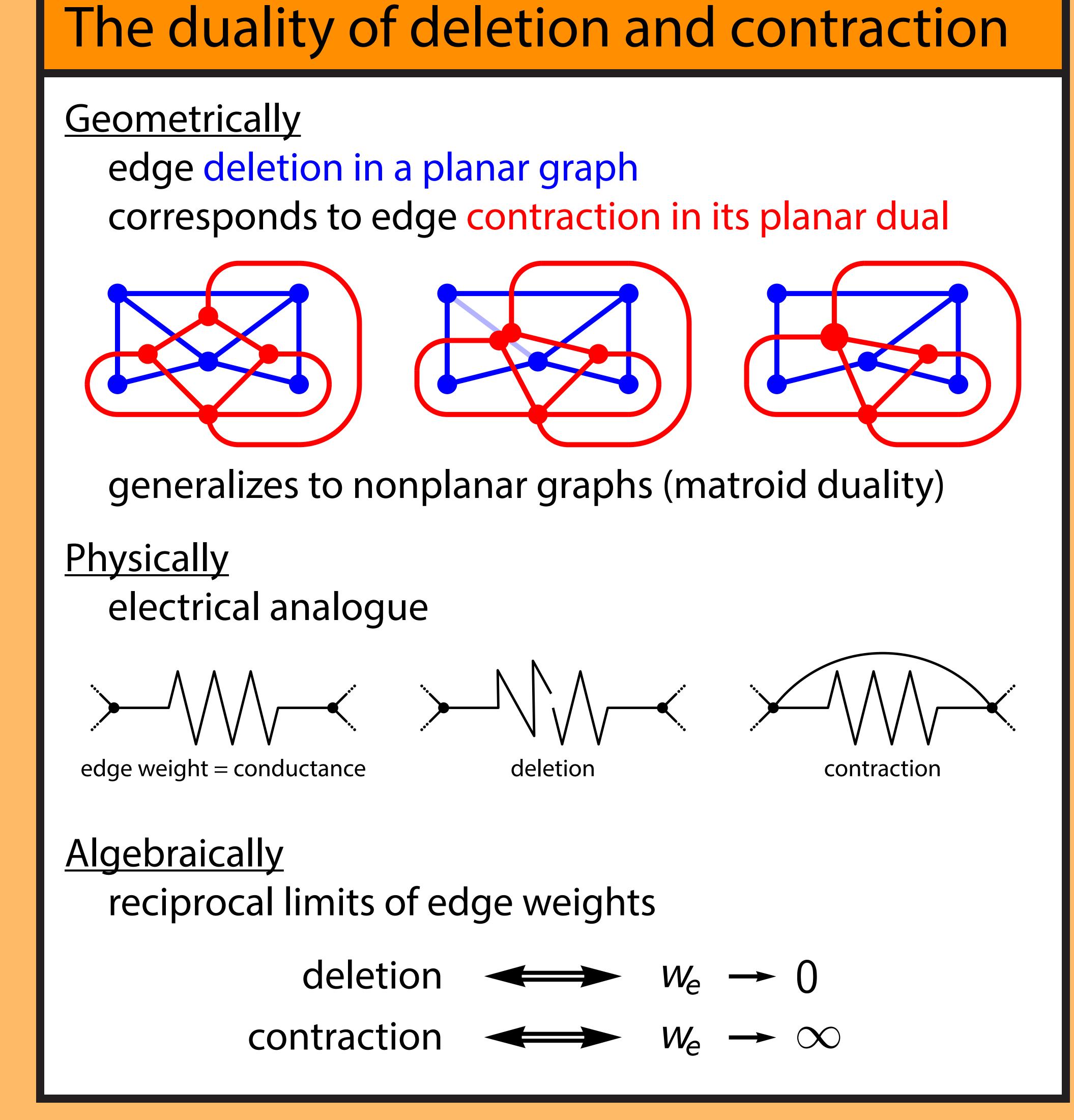
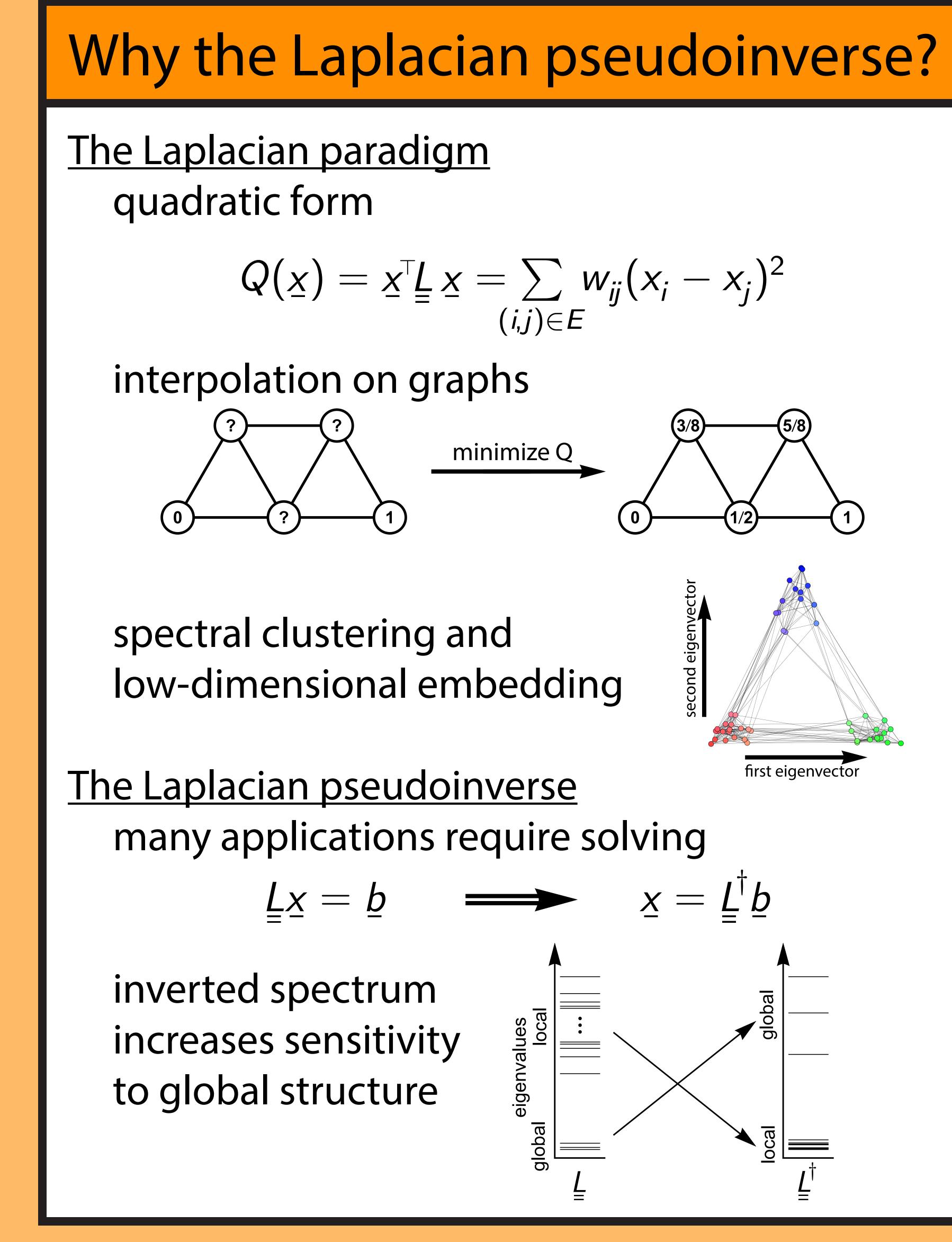


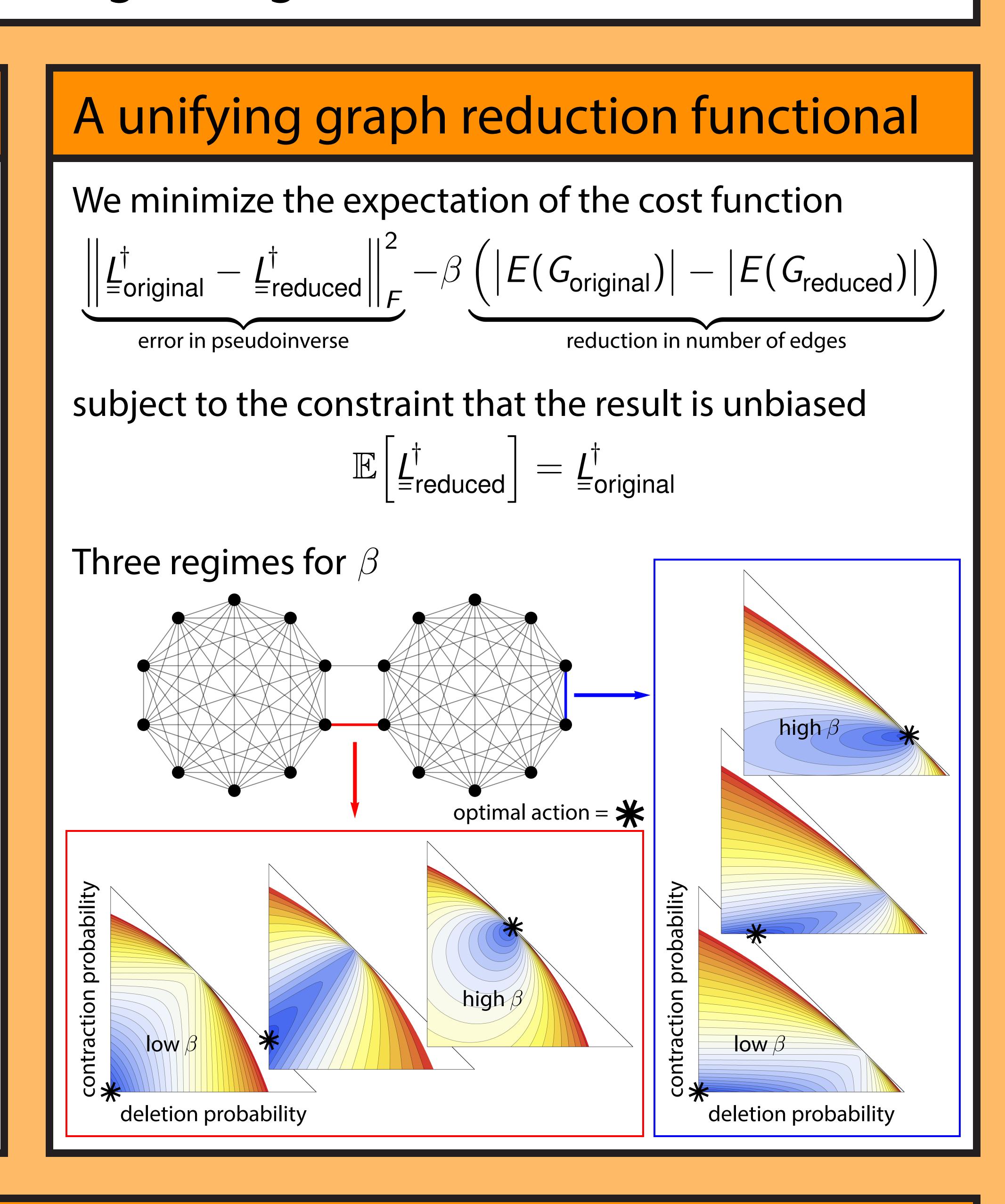
15-second summary

The deletion of edges (sparsification) and the merging of adjacent vertices (coarsening) are two common methods for reducing a graph. We analytically unify these two operations using a single objective function based on the graph Laplacian pseudoinverse, providing a principled algorithm that simultaneously sparsifies and coarsens a graph while preserving its large-scale structure.



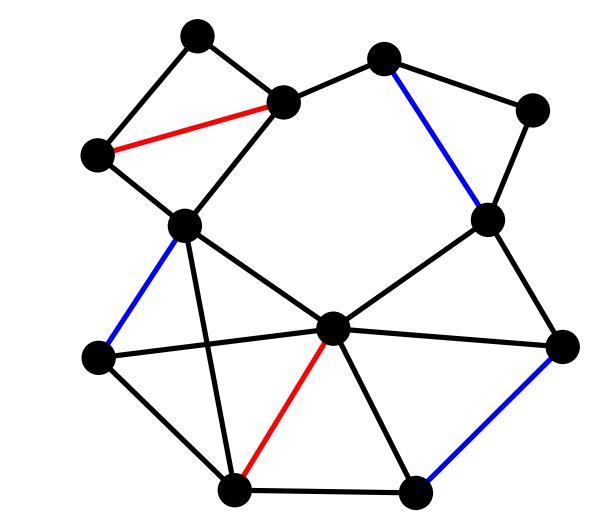




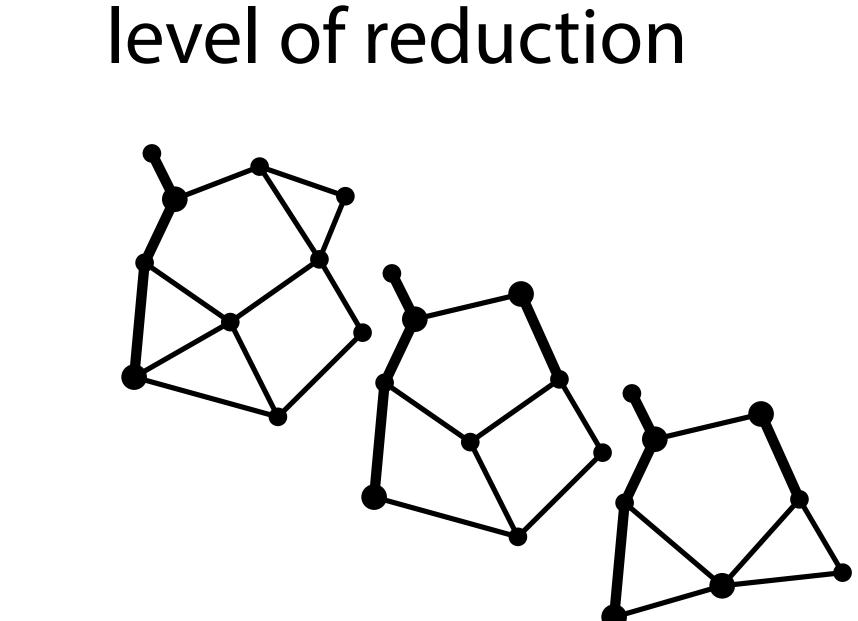


Our graph reduction algorithm

- 1) Sample a random independent edge set
 - fraction are acted upon



- 2) Choose β such that some 3) Delete, contract, or reweight using single-edge analysis



4) Repeat until desired

More accurate preservation of large-scale structure

