

# Main takeaways

- ▷ The rapid decrease of the singular values of adjacency matrices (i.e. low effective rank) offers a *justification for low-dimensional mathematical models* beyond mathematical and/or conceptual convenience.
- ▷ A *large proportion of real networks* can be considered as having a low effective rank.
- ▷ The *higher-order interactions* observed in some systems could be a *byproduct of a low-dimensional representation* used to analyze them.

# Challenges and open questions

- ▷ Could we *measure* the effective dimension *independently*?
- ▷ Could we design a *random graph model* based on *observed singular values* (singular vectors)?
- ▷ Are some of the *higher-order interactions* inferred from time series *artefacts of coarse-grained observations*?
- ▷ Could we designed more *interpretable observables*, perhaps nonlinear ones?



Vincent Thibeault  
Université Laval



Patrick Desrosiers  
Université Laval  
CERVO Brain research center

# Outline

1. Are simple models enough to study complex systems/networks?

## 2. “Simple” ways to encode structural complexity

(a) latent metric space

(b) stub types

