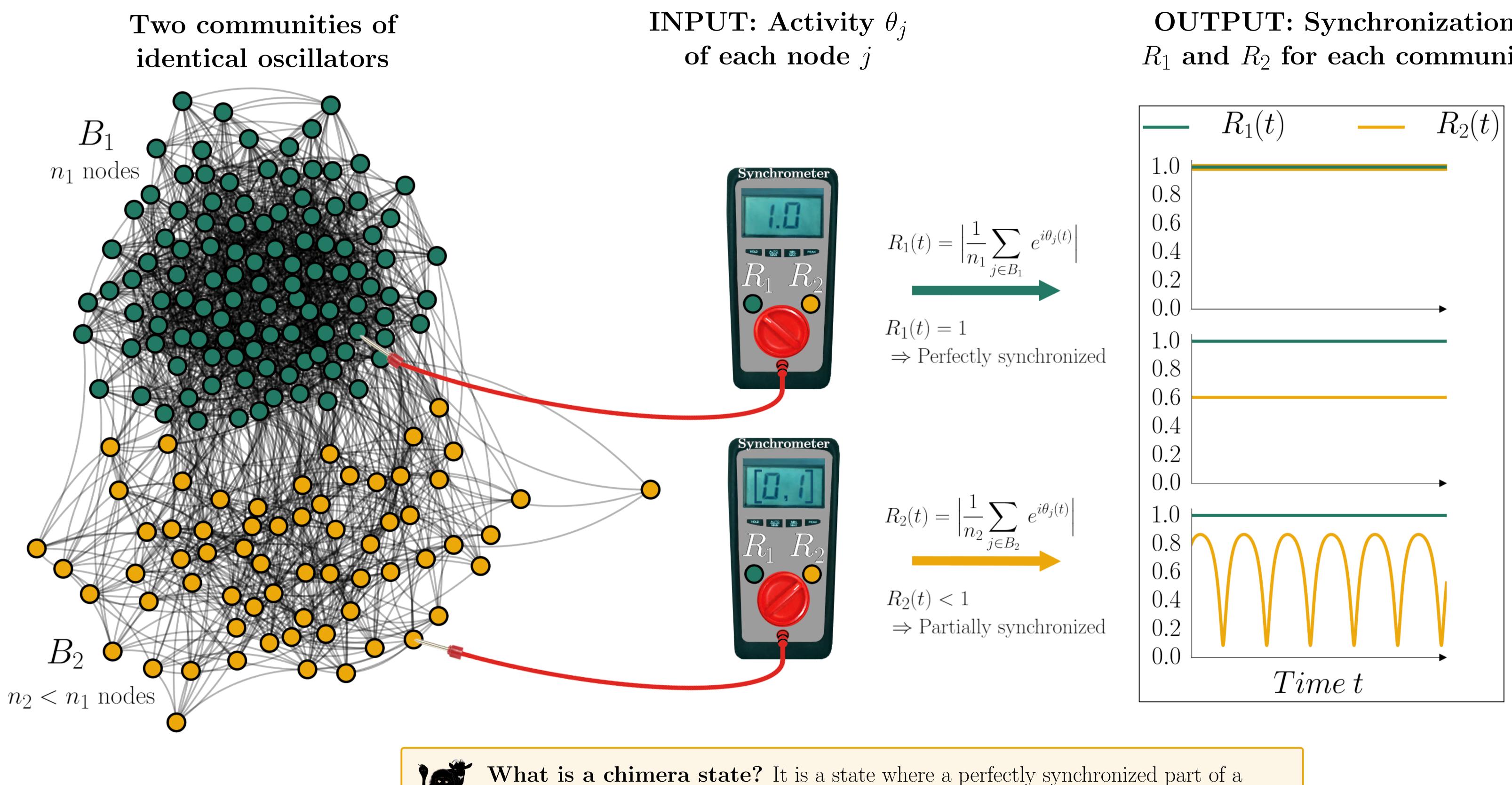
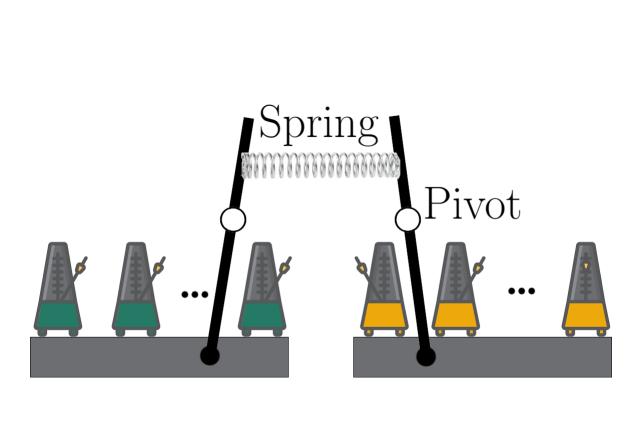


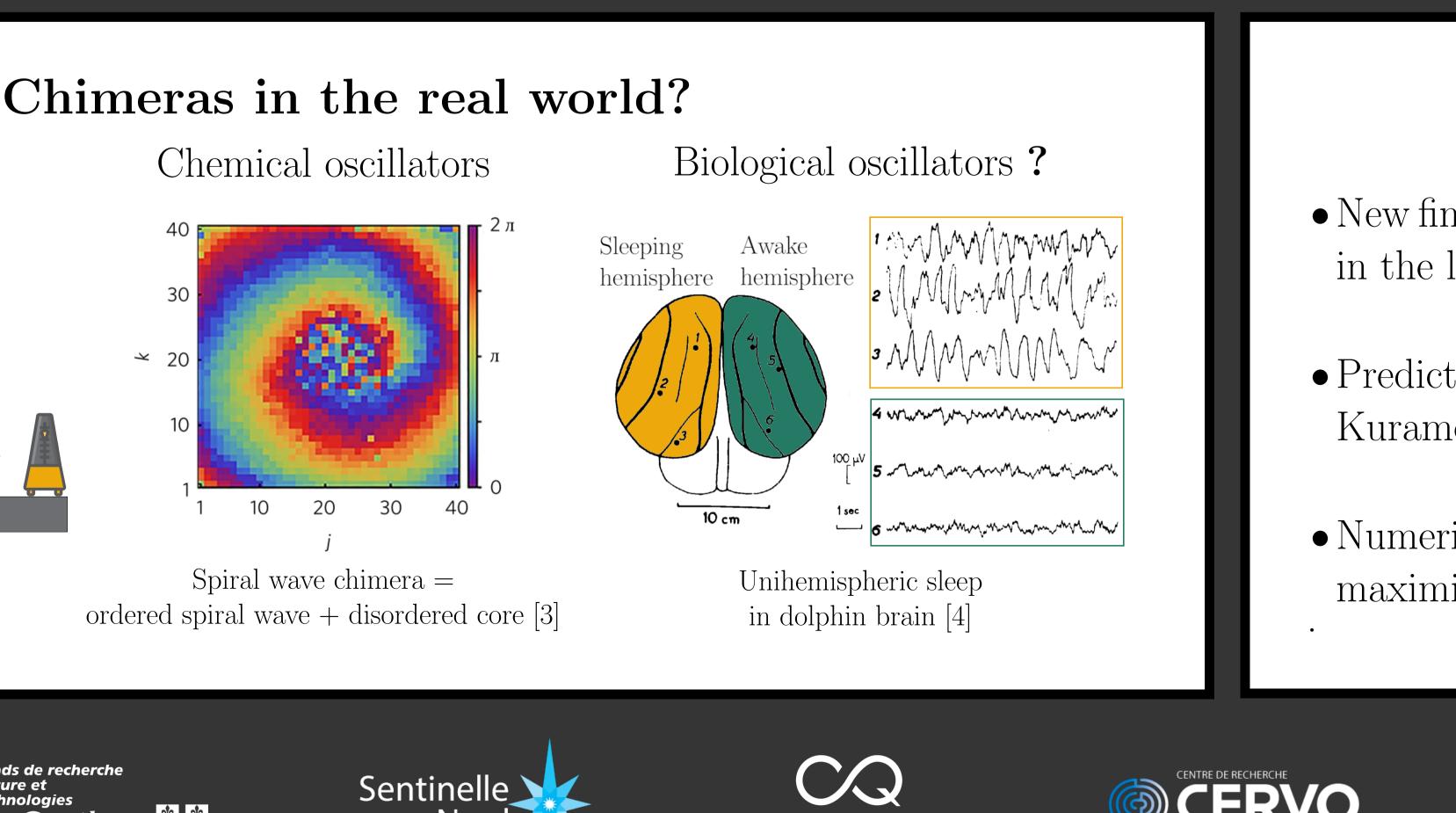
The impact of community structure on network dynamics: The case of synchronization V. Thibeault, X. Roy-Pomerleau, G. St-Onge, J-G. Young, L.J. Dubé and P. Desrosiers

Determining how the network structure affects its function remains one of the great challenges of Network Science. In neuroscience, synchronization of neurons plays a crucial role in many brain functions such as memory and consciousness. In ecology, flocks with tens of thousands of birds have been observed to fly in unison at high speeds and execute collectively complex maneuvers. Studying synchronization dynamics on networks with community structures will help to understand these complex systems.





Mechanical oscillators



Calcul **Québec**

Coupled metronomes [2]



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Nord 🗡



What is a chimera state? It is a state where a perfectly synchronized part of a coupled system of identical oscillators coexists with a partially synchronized part [1].

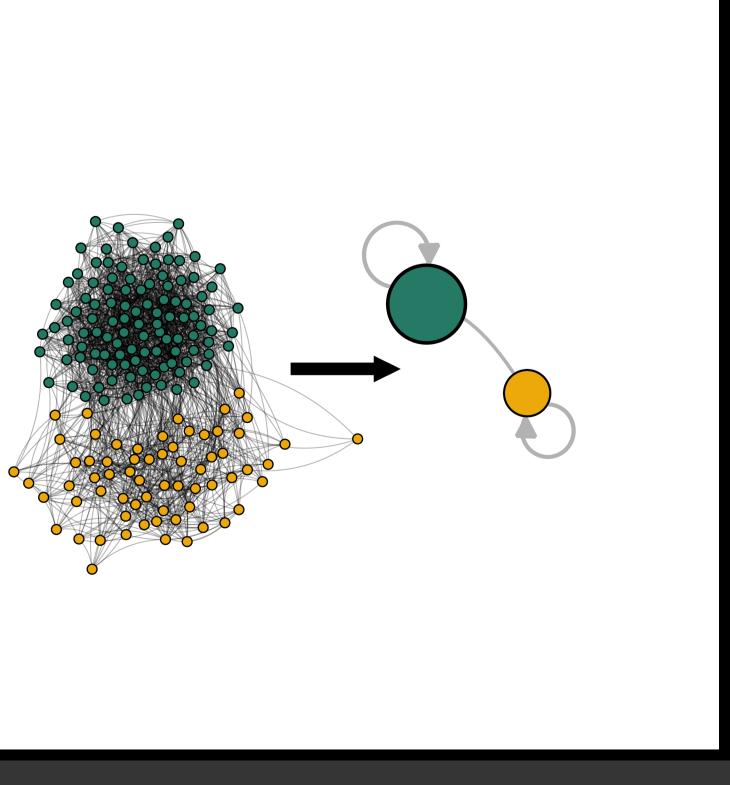
OUTPUT: Synchronization measures R_1 and R_2 for each community vs Time

Main contributions

• New finite size dimension reduction that behaves correctly in the limit $n_1 + n_2 \rightarrow \infty$;

• Prediction of the dynamical regimes in the Sakaguchi-Kuramoto dynamics on asymmetric modular networks;

• Numerical proof that there is a particular ratio $\frac{n_1}{n_2}$ that maximizes the possibility of having a chimera state.







Globally synchronized

> Stable chimera

Breathing chimera