## Titre

Integrating and extrapolating infectious disease epidemic data across spatial scales

## Encadrant

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## Description

Prevention and containment of epidemics of infectious diseases requires identifying the optimal spatial scale to deploy public health interventions. Should, for instance, vaccination campaigns or nonpharmaceutical interventions be enforced differently across neighboring communities or homogeneously over regions or countries? To answer that, models need data about diseases, host populations and their behavior, at high spatial resolution. These data may not always and everywhere be available, or may be available at a coarser spatial resolution. Is it possible to integrate data at different spatial scale to extrapolate disease risk and incidence data onto finer spatial scales, needed to inform public health action?

We will use data-driven approaches, integrating different data sources (COVID-19 and flu data, sociodemographic and mobility data) at different spatial resolutions to determine if epidemic surveillance and epidemic risk data can be extrapolated across scales, trying various approaches from statistics and machine learning. We will also use analytical approaches, mapping data extrapolation as a statistical physics system and performing entropic measures.

The outcome of this project will help determine the optimal scales for public health interventions aimed at preventing and containing infectious disease outbreaks.