Maud Menten Institute / Mathematical and Statistical Biology Seminar

Monday, January 12, 2026
12 pm PST (in person)
Clearihue A-329

Join Zoom Meeting
https://uvic.zoom.us/j/81909983859

Meeting ID: 819 0998 3859
Password: 010303

Attend the Watch Party:
At UAlberta @ 1:00 (MT) - room UComm 2-108
At UManitoba @2:00 (CT) - St. Paul's College - room 225

David Earn

Department of Mathematics and Statistics
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Epidemic Momentum

Infectious disease outbreaks have precipitated a profusion of mathematical models. Epidemic curves predicted by these models are typically qualitatively similar, despite distinct model assumptions, but there is no theoretical explanation for this similarity in terms of any recognised common structure. In addition, fits of epidemic models to time series conflate pathogen transmissibility with pre-existing population immunity, so only a single composite parameter can be inferred. I will discuss a new, unifying concept of "epidemic momentum"—prevalence weighted by potential to infect—which is more informative than prevalence, yet analytically tractable. Epidemic momentum reveals a common underlying geometry in which outbreak trajectories always follow contours of a conserved quantity. This previously unrecognised conservation law constrains how epidemics can unfold, enabling us to disentangle transmissibility from prior immunity and to infer each separately from the same time series. I will illustrate the significance of these insights with a novel reappraisal of the transmissibility of influenza during the 1918 pandemic. Beyond resolving an apparent identifiability problem, epidemic momentum also exposes the true final size of an outbreak and a universal phase-plane description that links generic renewal models to the classical SIR system.
(This is joint work with Todd Parsons, CNRS and Sorbonne Université, Paris)