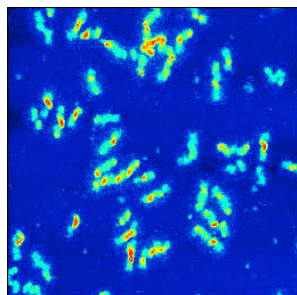# Mathematical Biology Seminar
Wednesday, April 21, 2021
Speaker: Mr. Paul Lemarre,
Université Claude-Bernard Lyon 1 & UC Merced


Title: Prions come in all shapes and sizes (Practice: PhD Defense)
Time: 9am
Zoom Link: https://ucmerced.zoom.us/j/98050375649
Passcode: 172069

Abstract: Following the discovery that prions are self-replicating assemblies of proteins, mathematical models were developed in parallel with experimental methods in order to conceptualize this phenomenon. After four decades of research, much insight has been gained into protein misfolding processes and the neurodegenerative diseases which they cause. However, the complexity of these systems remains undiminished and the classical models of protein aggregation are now showing their limits. In particular, the observed spectrum of objects generated during the propagation of prions is not accounted for in any model, whereas it keeps expanding under the development of experimental tools. During this PhD project, we seek to identify the weaknesses of classical models of prion propagation in light of recent biological evidence. We suggest modified and improved models, by including different processes, by adding more levels of organization and more diversity to protein aggregates. We detail two subprojects during this talk. The first one investigates the diversity of small PrP oligomers formed *in vitro*, and proposes a kinetic model that fully embraces the concept of structural diversity. The second project we focus on deals with the propagation of the [*PSI*+] prion inside growing yeast colonies. The problem at hand is intrinsically multi-scale, and we propose a novel modeling framework for it, impulsive differential equations.
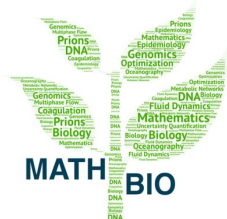
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