

**The Henri Poincaré
Distinguished Lecture Series
Presents:**



**Professor Henri Berestycki
(EHESS, PSL University, Paris)**

Thursday, March 7th, 2019, 4:30 – 5:30 pm – Room 380W

Predators-prey model with competition: Emergence of territoriality

I will start by introducing the classical Lotka-Volterra model, a dynamical system describing predator – prey interaction. This simple system is one of the cornerstones of mathematical ecology. Including spatial dependence and animal movement, one is led to a system of reaction-diffusion equations.

In this context, we have proposed with Alessandro Zilio a new model for predators like wolves that can divide into several hostile packs. This model, an extension of the original Lotka-Volterra system, rests on basic principles of predator – prey interaction and competition. Our purpose is to show with a basic model how territories and packs are formed among certain predators.

We analyze stationary states and various asymptotic behaviors of this system, especially when the competition parameter between packs becomes unbounded. One particular novel feature of our approach is to treat the number of components (packs) as a variable. The questions we address are to understand the conditions under which predators segregate into packs, how many packs a given environment can sustain, whether there is an advantage to have such hostile packs, and to discuss the different territory configurations that can arise. We can then compare the implications of this model with various observations.

Please note there will be a Special Tea: 3:30 – 4:30, 4th Floor Lounge