Long range dispersal vs Allee effect, Matthieu Alfaro (Univ. of Montpellier, France)

In this talk, we study the balance between long range dispersal kernels and the Allee effect in population dynamics models.

To do so, we first revisit the so called Fujita blow up phenomena [5] for the nonlocal diffusion equation $\partial_t u = J * u - u + u^{1+p}$. We prove that the Fujita exponent dramatically depends on the behavior of the Fourier transform of the kernel J near the origin, which is linked to the tails of J.

Then, as an application of the result in population dynamics models, we discuss the so called hair trigger effect [4] for $\partial_t u = J * u - u + u^{1+p}(1-u)$.

Last, we consider the spreading properties of the above equation. Our interest is twofold: we investigate the existence/non existence of travelling waves, and the propagation properties of the Cauchy problem, more precisely the possibility of accelaration [7], [6] during an invasion.

References

[1] M. Alfaro, *Fujita blow up phenomena and hair trigger effect: the role of dispersal tails*, to appear in Ann. Inst. H. Poincaré Anal. Non Linéaire.

[2] M. Alfaro, *Slowing Allee effect vs. accelerating heavy tails in monostable reaction diffusion equations*, Nonlinearity **30** (2017), 687–702.

[3] M. Alfaro and J. Coville, *Propagation phenomena in monostable integro-differential equations: acceleration or not?*, submitted.

[4] D. G. Aronson and H. F. Weinberger, *Multidimensional nonlinear diffusion arising in population genetics*, Adv. in Math. **30** (1978), 33–76.

[5] H. Fujita, *On the blowing up of solutions of the Cauchy problem for* $u_t = \Delta u + u^{1+\alpha}$, Journal of the Faculty of Science **13** (1966), 109–124.

[6] J. Garnier, *Accelerating solutions in integro-differential equations*, SIAM J. Math. Anal. **43** (2011), 1955–1974.

[7] F. Hamel and L. Roques, *Fast propagation for KPP equations with slowly decaying initial conditions*, J. Differential Equations **249** (2010), 1726–1745.