

# Flocks as Materials and Materials out of Flocks

Denis Bartolo

<sup>1</sup> Affiliation et adresse complète du premier auteur (12 points, centré, italique)

<sup>1</sup> *Laboratoire de Physique de l'Ecole Normale Supérieure de Lyon, Université de Lyon, 46, allée d'Italie, 69007 Lyon, France*

*Adresse email de l'orateur : denis.bartolo@ens-lyon.fr*

Could the behavior of bacteria swarms, fish schools, and bird flocks be understood within a unified framework? Can one ignore the very details of the interaction mechanisms at the individual level to elucidate how strikingly similar collective motion emerges at the group level in this broad range of motile systems? These seemingly provocative questions have triggered significant advance in the physics and the biology, communities over the last decade. In the physics language these systems, made of motile individuals, can all be thought as different realizations of 'active matter'. In this talk, I will show how to gain more insight into this vivid field using self-propelled colloids. I will then show how to motorize colloidal particles capable of sensing the orientation of their neighbors. Finally, I will demonstrate that these archetypal populations display genuine non-equilibrium transitions toward swarming and swirling motion. Our results will be discussed in the broader context of polar active-matter theory.

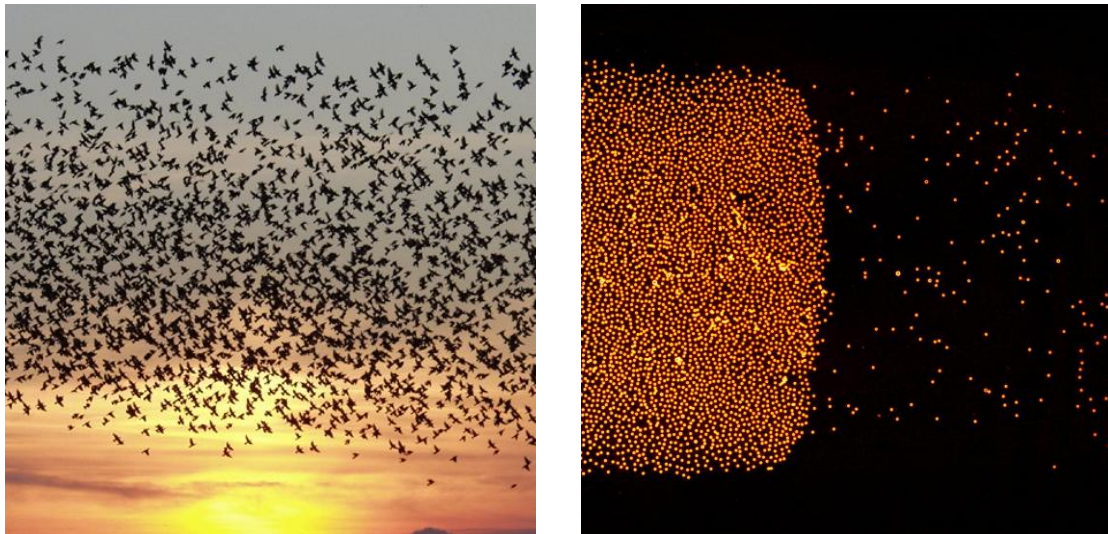


Figure: (Left) Photograph of a flock of starlings flying in the sky. (© Tommy Hansen). (Right) Photograph of a flock of self-propelled colloids cruising in a microfluidic channel. Colloid diameter : 5 microns. (© A. Bricard, N. Desreumaux and D. Bartolo).