8-10 January 2018

From Active Matter to Complex Fluids

Château de Valrose, Nice, France

Scientific program and Organization:

Fernando Peruani, Univesity Nice Sophia Antipolis (FR)

Giorgio Volpe, University College London (UK)

Giovanni Volpe, University of Gothenburg (SE)

Alvaro Marin, University of Twente (NL)

cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

COST MP1305
FLOWING · MATTER

Financially supported by :

COST MP1305
FLOWING · MATTER

cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Workshop "From Active Matter to Complex Fluids"

Organizers: Alvaro Marin, Giorgio Volpe, Giovanni Volpe, Fernando Peruani
Funding: COST Action Flowing Matter

workshop program

from	to	DAY 1	DAY 2	DAY 3
9:00:00 am	9:35:00 am	Frey, Erwin	Löwen, Hartmut	Speck, Thomas
9:35:00 am	10:50:00 am	contributed talks (1-6)	contributed talks (12-17)	contributed talks (23-28)
10:50:00 am	11:20:00 am	coffee break	coffee break	coffee break
11:20:00 am	11:55:00 am	Beta, Carsten	Simmchen, Juliane	Golestanian, Ramin
11:55:00 am	12:30:00 pm	Isa, Lucio	Gompper, Gerhard	Chaté, Hugues/Shi, Xiaqing
12:30:00 pm	1:05:00 pm	Durham, William	Sagues, Francesc	Bertin, Eric
1:05:00 pm	2:35:00 pm	Lunch	Lunch	Lunch
2:35:00 pm	3:10:00 pm	Stenhammar, Joakim	Lindner, Anke	Di Leonardo, Roberto
3:10:00 pm	4:10:00 pm	contributed talks (7-11)	contributed talks (18-22)	contributed talks (29-33)
4:10:00 pm	4:30:00 pm	coffee break	coffee break	coffee break
4:30:00 pm	5:05:00 pm	Pagonabarraga, Ignacio	Wilczek, Michael	Tuval, Idan
5:05:00 pm	5:40:00 pm	Sitti, Metin	Toschi, Federico	Polin, Marco

Contributed Talks

Monday 8th	Tuesday 9th	Wednesday 10th
Morning session	Morning session	Morning session
Micheline Abbas	*Robert Großmann*	*Massimiliano Rossi*
Dario Vincenzi	*Moritz Linkmann*	*Sanjay Kumar*
F. Alarcon Oseguera	*Emanuele Locatelli*	*Henry Christophe*
Alessandro Magazzu	*Tuğba Andaç*	*Massiera Gladys*
Arianna Bottinelli	*Daniel Strömbom*	*Maziyar Jalaal*
Mickael Bourgoin	*Thomas Voigtmann*	*Emiliano Perez Ipiña*
Afternoon session	Afternoon session	Afternoon session
Luis A. Gómez Nava	*Borge ten Hagen*	*Cesare Nardini*
M.L. Ekiel-Jezewska	*Jalpa Soni*	*Hossein Nili*
Thomas Franosch	*Mihail Popescu*	*Oleksandr Chepizhko*
Maria Helena Godinho	*William Uspal*	*Tyler Shendruk*
Giuseppe Gonnella	*Ron Shnapp*	*Christopher Trombley*

The titles and abstracts of invited talks, contributed talks, and posters are listed below in the order they appear in the program.

Luis Alberto Gómez Nava

Markovian microrobots - How to perform complex tasks by local sensing without memory

Today's medicine aims at, among many other examples, fabricating micrometer-sized robots for target-specific drug delivery, clearing clogged-up arteries or early detection of cancer cells. Motion at the microscale underlies a series of physical constains: viscous forces dominate over intertial ones, thermal fluctuations are not negligible and external signals can only be sensed locally (instantaneous concentrations gradients are inaccessible). How to navigate under these physical constraints is a nontrivial task. Here, we provide a proof of principle by intrducing a class of theoretical, autonomous machines called Markovian microrobots which can perform complex tasks at the microscale, e.g. chemotaxis, chemokinesis, detection of concentration minima or maxima or following a desired level of concentration in a dynamical concentration field, notably without the use of memory.

Maria L. Ekiel-Jezewska

Sedimenting elastic trumbbells

We examine theoretically and numerically the impact of a chosen elastic model on the dynamics of filaments and trumbbells settling in a viscous fluid under gravity at low-Reynolds-number. We use the Rotne-Prager mobility to describe hydrodynamic interactions between the trumbbell beads. As the most significant result, we provide examples which illustrate that the Kratky-Porod bending model (often used in the literature) can lead to a spurious dynamics that qualitatively and quantitatively differs from the results obtained using the classical harmonic bending model. Moreover, we find a new family of periodic oscillations of two elastic trumbbells and demonstrate that bending energy plays the essential stabilizing role – analogical configurations of dumbbells repel each other horizontally.

Thomas Franosch

Spatiotemporal dynamics of catalytic Janus particles

Self-propelled particles are intrinsically out of equilibrium and exhibit peculiar dynamical behavior due to the complex interplay of stochastic fluctuations and directed swimming motion. We use differential dynamic microscopy and single-particle tracking to characterize the spatiotemporal behavior of active Janus colloids in terms of the intermediate scattering function. We provide an analytical solution for the intermediate scattering function of the paradigmatic active Brownian particle model and find striking agreement from the smallest length-scales where translational Brownian motion dominates, up to the largest ones, which probe effective diffusion due to rotational Brownian motion. Characteristic oscillations emerge as most prominent feature at intermediate length scales which resolve the crossover from the persistent swimming motion to the relaxation of the orientation. These intermediate