Part B-2

(*No overall page limit applied*)

4. CV of the researcher

Education

2015-2021 PhD degree at the Department of Chemical Engineering and Materials Science at the University of Minnesota, USA

Novel properties and emergent collective phenomena of active fluids supervised by X. Cheng

2010-2014 Bachelor's degree at the Chemical Engineering Department of Tsinghua University, Beijing

Entropy-mediated self-assembly of Janus particles at fluid interface supervised by L.-T. Yan

Publications

Under review

Z. Liu, W. Zeng, X. Ma, X. Cheng, *Density Fluctuations and Energy Spectra of 3D Bacterial Suspensions* (2021)

Published

- Y. Qiao, C. Fan, **Z. Liu**, D. Medina, N. C. Keim, *and* X. Cheng, *Miniature magnetic rod interfacial stress rheometer for general-purpose microscopes*, J. Rheol. 65, 1103-1110 (2021)
- Y. Peng, **Z. Liu** and X. Cheng, *Imaging the emergence of bacterial turbulence: Phase diagram and transition kinetics*, Sci. Adv. 7, eabd1240 (2021)
- **Z. Liu**, K. Zhang, X. Cheng, *Rheology of bacterial suspensions under confinement*, Rheol. Acta 58, 439-541 (2019)
- O. Yang, Y. Peng, **Z. Liu**, C. Tang, X. Xu, and X. Cheng, *Dynamics of ellipsoidal tracers in swimming algal suspensions*, Phys. Rev. E 94, 042601 (2017)
- **Z. Liu**, R. Guo, G. Xu, Z. Huang, L.-T. Yan, *Entropy-mediated mechanical response of the interfacial nanoparticle patterning*, Nano Lett. 14, 6910-6916 (2014)
- R. Guo, **Z. Liu**, X.-M. Xie, L.-T. Yan, *Harnessing dynamic covalent bonds in patchy nanoparticles: creating shape-shifting building blocks for rational and responsive self-assembly*, J. Phys. Chem. Lett. 4, 1221-1226 (2013)

Conference talks

- *Giant Number Fluctuations In 3-D Bacterial Active Turbulence,* APS DFD Meeting Virtual, 11/2020
- *Imaging the swarming transition using light-controlled bacteria*, APS March Meeting, DSOFT Active Matter Virtual Session, 03/2020
- *Rheology of bacterial suspensions under confinement*, 91st Society of Rheology Meeting, Raleigh, NC, USA, 10/2019
- *Understanding the effect of confinement on the viscosity of bacterial suspensions*, APS March Meeting, Boston, MA, USA, 03/2019
- *Viscosity of confined bacterial suspensions*, 90th Society of Rheology Meeting, Houston, TX,

USA, 10/2018

Teaching Experience

2019.9-2019.12 Teaching assistant of *Senior Chemical Engineering Lab*

2018.9-2018.12 Teaching assistant of *Biochemical Engineering*

2016.9-2016.12 Teaching assistant of *Transport Phenomena*

Honors and Awards

2019.10 Society of Rheology Meeting Student Travel Grant

2015.9 Frank & Janis Bates Research Fellowship

5. Capacity of the Participating Organisation(s)

5.1 Template table: *Overview of Participating Organisations*

Organisation role	PIC	Legal Entity Short Name	Academic organisation (Y/N)	Country	Name of Supervisor
Beneficiary	975116460	ESPCI	Y	France	Eric Clement Anke Lindner Teresa Lopez-Leon
Associated partner linked to a beneficiary (if applicable)					
Associated partner for outgoing phase (mandatory for GF)					
Associated partner for secondment (optional)	893380768	Universidad de Chile	Y	Chile	Rodrigo Soto
Associated partner for non-academic placement (optional)					
Other: _____					

5.2 Template table: *Capacity of the Participating Organisations*

Beneficiary (compulsory)	
Ecole Supérieure de Physique et Chimie de la Ville de Paris, ESPCI, France	
General description The host lab, ***Le laboratoire de Physique et Mécanique des Milieux Hétérogènes*** (PMMH, UMR 7636) is a multidisciplinary experimental research unit in the fields of fluid dynamics, soft matter and mechanics. The originality of the PMMH, which has forged a particular identity in the French research landscape, is to have chosen to position itself at the interfaces of the disciplines. The main research areas of PMMH are fluid and solid mechanics. Recently, many more topics have been developed using the concepts from these two fields. New interdisciplinary questions, for example biophysics and biomechanics, are investigated. The other host lab, ***Gulliver*** (UMR 7083) is also a group of experimentalists working at the interface of physics, chemistry, biology and computer science. The research in Gulliver focuses on soft matter, active matter and molecular systems. The name Gulliver captures the key aspect of the studies in the lab: the diversity of scales. There are strong active matter research communities based in the PMMH and Gulliver labs, involving both experimentalists and theorists. Support from experts in fluid mechanics and biology is also very accessible. Overall, there host labs form an ideal set of expertise to carry out the proposed research. The host institute ESPCI is a leading French "Grande Ecole" founded in 1882, educating undergraduate and graduate students through a programme merging basic science and engineering, as well as a world-renowned research institution.	
Role and profile of supervisor	Eric Clement *Professor of Physics, Sorbonne University, Paris* *Senior member of the Institut Universitaire de France (IUF)* More than 115 papers published in international journals, 1 patent
Key research facilities, Infrastructure and Equipment	Workplace: each workplace is organized with a desktop computer connected to a smoothly functioning network managed by the technical staff at the PMMH laboratory. Library: there is a library with rich collections of books and journals in the ESPCI main building. Transfer of knowledge: seminars are held on weekly basis in PMMH. Relevant seminars from other ESPCI labs are also accessible. Review: Regular meetings between the project supervisor and the applicant are scheduled as described in part B-1, to monitor the progress of the project and discuss mutual discussions.
Previous and current involvement in EU-funded research and training programmes/actions/projects	**Innovative Training Networks** H2020-MSCA-ITN-2020 – PHYMOT *Physics of Microbial Motility* with Prof. A. Lindner and 13 other European groups. PI Prof. G. Gompper Forschugzentrum, Julich. **ANR** 2015-2021 - BacFlow "Hydrodynamic transport and dispersion of bacterial suspensions: from the micro-hydrodynamic scale up to porous media" PI E.Clément with A.Auradou and C.Douarche, Univ.ParisSud.

Associated partner for secondment (optional)	
Universidad de Chile, Universidad de Chile, Chile	
General description Universidad de Chile was founded on the 19th of November, 1842. It is the oldest higher education institution in Chile. Generating, developing, integrating and communicating knowledge in all the areas of knowledge and culture are the mission and basis of the activities of the University. This makes up the involvedness of their work and directs the education they impart.	
Role and profile of supervisor	Rodrigo Soto *Professor at Universdad de Chile* 86 research papers published in international journals
Key research facilities, Infrastructure and Equipment	**Technological platform:** 100% wifi coverage and IP phone system in all the faculties and institutes; availability of video-conference and/or video-streaming for distance learning.
Previous and current involvement in EU-funded research and training programmes/actions/projects	- **2012 – 2014: ECOS project C11E04** Transport in active suspensions and dense granular matter, R. SOTO (Chilean responsible), E. CLÉMENT (French responsible) - **2016 – 2019: ECOS project C16E03** Active fluids in confined environments, R. SOTO (Chilean responsible), E. CLÉMENT (French responsible), M. L. CORDERO (Chilean associate), A. LINDNER (French associate).

6. Additional ethics information

No additional ethics information.

7. Additional information on security screening

No additional information on security screening.

8. Letter(s) of commitment from associated partners (host for outgoing phase of Global Fellowship or non-academic placement host)