

Call: HORIZON-MSCA-2021-PF-01

(MSCA Postdoctoral Fellowships 2021)

Topic: HORIZON-MSCA-2021-PF-01-01

Type of Action: HORIZON-TMA-MSCA-PF-EF

(HORIZON TMA MSCA Postdoctoral Fellowships - European Fellowships)

Proposal number: SEP-210778175

Proposal acronym: TMAB

Type of Model Grant Agreement: HORIZON Unit Grant

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1 - General information

Fields marked * are mandatory to fill.

Topic	HORIZON-MSCA-2021-PF-01-01	Type of Action	HORIZON-TMA-MSCA-PF-EF
Call	HORIZON-MSCA-2021-PF-01	Type of Model Grant Agreement	HORIZON-AG-UN

Acronym **TMAB**

Proposal title **Fluctuations of passive objects in confined active baths**

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Scientific Area **PHY - Physics (PHY)**

Please select up to 5 descriptors (and at least 3) that best characterise the subject of your proposal, in descending order of relevance.

Descriptor 1 **Soft condensed matter**

Free keywords **active matter, bacteria, microfluidics, confinement, curvature, emulsion, fluctuations, modeling trajectories, effective temperature, droplet, tracking, confocal**

Please choose the scientific area and descriptors carefully, and in order of importance, since this will guide the REA in the selection of experts for proposal evaluation and the allocation of proposals to experts.

Abstract *

"Thermometer" of an active bath -- A systematic experimental investigation into the fluctuations of passive objects in active baths

Original non-equilibrium phenomena arise in active matter in the presence of confinement. This project aims at studying the fundamental principles governing the emergence of collective organization and structured interaction when active and passive objects interact both under confinement and in the presence of curvature. This project will pave the way towards the elaboration of novel soft-matter exotic phases.

The interplay between complex environments and active matter suggests a possibility to control and engineer active matter by carefully designing the confinement structures. It is now well established that confinement may influence transport[□], rheology, pressure[□], spatial distribution[□] and collective motion[□] of active matter. However, curved confining walls, which are ubiquitous in biological systems, show of their own, specific rich and intriguing effects on active matter. Systematic experiments in a well controlled and measurable experimental system will deepen our understanding of confinement effects on active-passive interactions, guiding real-life applications of active matter.

In this project, we propose to build a well-controlled active matter experiment based on the 3D tracking of particles driven by a bath of motile bacteria which are confined inside spherical droplets using a double emulsion technique. This novel experimental system stems from two key technological innovations and will enable a systematic investigation in to the following topics:

- Active motion of passive spheres confined in droplets
- Exploring the validity and consequences of the "active temperature" concept
- Complex-shape objects in confined active baths: towards new self-assembly principles

A collaborative efforts of theoretical and experimental approaches will advance the fundamental understanding of active matter.

Remaining characters **0**

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Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under any EU programme, including the current call? *

☐ Yes ☒ No

Please give the proposal reference or contract number.

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Declarations

Field(s) marked * are mandatory to fill.

1) We declare to have the explicit consent of all applicants on their participation and on the content of this proposal. * ☒

2) We confirm that the information contained in this proposal is correct and complete and that none of the project activities have started before the proposal was submitted (unless explicitly authorised in the call conditions). ☒

3) We declare:
- to be fully compliant with the eligibility criteria set out in the call
- not to be subject to any exclusion grounds under the [EU Financial Regulation 2018/1046](#)
- to have the financial and operational capacity to carry out the proposed project. ☒

4) We acknowledge that all communication will be made through the Funding & Tenders Portal electronic exchange system and that access and use of this system is subject to the [Funding & Tenders Portal Terms and Conditions](#). ☒

5) We have read, understood and accepted the [Funding & Tenders Portal Terms & Conditions](#) and [Privacy Statement](#) that set out the conditions of use of the Portal and the scope, purposes, retention periods, etc. for the processing of personal data of all data subjects whose data we communicate for the purpose of the application, evaluation, award and subsequent management of our grant, prizes and contracts (including financial transactions and audits). ☒

6) We declare that the proposal complies with ethical principles (including the highest standards of research integrity as set out in the [ALLEA European Code of Conduct for Research Integrity](#), as well as applicable international and national law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols. [Appropriate procedures, policies and structures](#) are in place to foster responsible research practices, to prevent questionable research practices and research misconduct, and to handle allegations of breaches of the principles and standards in the Code of Conduct. ☒

7) We declare that the proposal has an exclusive focus on civil applications (activities intended to be used in military application or aiming to serve military purposes cannot be funded). If the project involves dual-use items in the sense of [Regulation 428/2009](#), or other items for which authorisation is required, we confirm that we will comply with the applicable regulatory framework (e.g. obtain export/import licences before these items are used). ☒

8) We confirm that the activities proposed do not
- aim at human cloning for reproductive purposes;
- intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or
- intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.
- lead to the destruction of human embryos (for example, for obtaining stem cells)
These activities are excluded from funding. ☒

9) We confirm that for activities carried out outside the Union, the same activities would have been allowed in at least one EU Member State. ☒

The coordinator is only responsible for the information relating to their own organisation. Each applicant remains responsible for the information declared for their organisation. If the proposal is retained for EU funding, they will all be required to sign a declaration of honour.

False statements or incorrect information may lead to administrative sanctions under the EU Financial Regulation.

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2 - Participants

List of participating organisations

#	Participating Organisation Legal Name	Country	Action
1	ECOLE SUPERIEURE DE PHYSIQUE ET DECHIMIE INDUSTRIELLES DE LA VILLE DEPARIS	France	

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Short name

Organisation data

PIC	Legal name
975116460	ECOLE SUPERIEURE DE PHYSIQUE ET DECHIMIE INDUSTRIELLES DE LA VILLE DEPARIS

Short name: ESPCI Paris

Address

Street	RUE VAUQUELIN 10
Town	PARIS
Postcode	75231
Country	France
Webpage	https://www.espci.fr

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	20/09/2016 - no
SME self-assessment	unknown
SME validation	unknown

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Departments carrying out the proposed work

Department 1

Department name	Physics and Materials laboratory (PMMH) - UMR 7636	<input type="checkbox"/> not applicable
	<input checked="" type="checkbox"/> Same as proposing organisation's address	
Street	RUE VAUQUELIN 10	
Town	PARIS	
Postcode	75231	
Country	France	

Department 2

Department name	Gulliver laboratory - UMR7083	<input type="checkbox"/> not applicable
	<input checked="" type="checkbox"/> Same as proposing organisation's address	
Street	RUE VAUQUELIN 10	
Town	PARIS	
Postcode	75231	
Country	France	

Links with other participants

Type of link	Participant
Same Group	

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Supervisor

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Prof.**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Eric**

Last name* **Clement**

E-Mail* **eric.clement@upmc.fr**

Position in org. **Professor**

Department **ECOLE SUPERIEURE DE PHYSIQUE ET DECHIMIE INDUSTRIELLES DE LA VILLE DEPAR**

☒ Same as organisation name

☒ Same as proposing organisation's address

Street **RUE VAUQUELIN 10**

Town **PARIS**

Post code **75231**

Country **France**

Website **https://blog.espci.fr/eclement/**

Phone **33 (0) 1 40 79 47 14**

Phone 2 **+xxx xxxxxxxxx**

Other contact persons

First Name	Last Name	E-mail	Phone
Lucie	Ebran	europe@espci.fr	33 (0)1 40 79 43 26

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Researcher

The name and e-mail of the Researcher and Supervisor are read-only in the administrative form, only additional details can be edited here. To give access rights and contact details of contact persons, please go back to Participant's page of the submission wizard and save the changes.

Last Name*	Liu	Last Name at Birth	Liu
First Name(s)*	Zhengyang	Gender*	<input type="radio"/> Woman <input checked="" type="radio"/> Man <input type="radio"/> Non binary
Title	Dr.	Country of residence*	France
Nationality*	China (People's Republic of)	Nationality 2	
Date of Birth (DD/MM/YYYY)	12/11/1991	Country of Birth*	China (People's Republic of)
		Place of Birth	Xi'an

Contact address

Current organisation name	ECOLE SUPERIEURE DE PHYSIQUE ET DECHIMIE INDUSTRIELLES DE LA VILLE DEPARIS		
Current Department/Faculty/Institute/Laboratory name	Physics and Materials laboratory (PMMH) - UMR 7636		
	<input checked="" type="checkbox"/> Same as organisation address		
Street	RUE VAUQUELIN 10		
Postcode/Cedex	75231	Town	PARIS
Phone	01 40 79 44 00	Country	France
Phone2 / Mobile	+xxx xxxxxxxxx		
E-Mail*	zhengyang.liu@espci.fr		
ORCID	0000-0001-6986-3160		
Researcher ID			
Other ID	Please enter the type of ID here		Please enter the identifier number here

Qualifications

Doctorate Date of (expected) award	Select the exact date (DD/MM/YYYY)	10/02/2021
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Place of activity/place of residence (previous 5 years - most recent one first)

Indicate the period(s) and the country/countries in which you have legally resided and/or had your main activity (work, studies, etc) during the last 5 years up until the deadline for the submission of the proposal.

Please fill in this section without gaps. Short stays (as defined in the Guide for Applicants) shall not be listed in this box.

Period from	Period to	Duration (days)	Country
19/04/2021	12/10/2021	177	France
25/08/2015	04/18/2021	2476	United States
Total		2653	

Role of participating organisation in the project

Project management	<input checked="" type="checkbox"/>
Communication, dissemination and engagement	<input checked="" type="checkbox"/>
Provision of research and technology infrastructure	<input checked="" type="checkbox"/>
Co-definition of research and market needs	<input type="checkbox"/>
Civil society representative	<input type="checkbox"/>
Policy maker or regulator, incl. standardisation body	<input checked="" type="checkbox"/>
Research performer	<input checked="" type="checkbox"/>
Technology developer	<input checked="" type="checkbox"/>
Testing/validation of approaches and ideas	<input checked="" type="checkbox"/>
Prototyping and demonstration	<input type="checkbox"/>
IPR management incl. technology transfer	<input type="checkbox"/>
Public procurer of results	<input type="checkbox"/>
Private buyer of results	<input type="checkbox"/>
Finance provider (public or private)	<input type="checkbox"/>
Education and training	<input checked="" type="checkbox"/>
Contributions from the social sciences or/and the humanities	<input type="checkbox"/>
Other If yes, please specify: (Maximum number of characters allowed: 50)	<input type="checkbox"/>

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List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	<i>Junot, G., Darnige, T., Lindner, A., Martinez, V. A., Arlt, J., Dawson, A., Poon, W. C. K., Auradou, H., & Clément, E. (2021).</i>
Publication	<i>Run-to-tumble variability controls the surface residence times of E. coli bacteria. ArXiv, 2107.11123.</i>
Publication	<i>3D Spatial Exploration by E. coli Echoes Motor Temporal Variability. Physical Review X, 10(2), 1–12.</i>
Publication	<i>Figuerola-Morales, N., Soto, R., Junot, G., Darnige, T., Douarche, C., Martinez, V. A., Lindner, A., & Clément, É. (2020).</i>

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
<i>3D Lagrangian tracking microscope</i>	<i>A microscope capable of tracking objects in 3D space</i>
<i>Nanoscribe 3D printer</i>	<i>A two-photon 3D printer capable of printing with high precision</i>

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Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☒ Yes ☐ No

Minimum requirements (building blocks) for a GEP

Public GEP: formal document published on the institution's website and signed by the top management, addressing the following issues:

- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel and students and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Minimum areas** to be **covered** and addressed via concrete measures and targets:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

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3 - Budget

Is the Researcher eligible for family allowance?* ☒ Yes ☐ No

Duration of fellowship	Country in which fellowship will take place
24	France

	Country Coefficient	Number of Months	Contributions for recruited researchers			Institutional contributions		Total
			Living Allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and indirect costs	
Fellowship	1.164	24	141914.88	14400.00	15840.00	24000.00	15600.00	211754.88
Total			141914.88	14400.00	15840.00	24000.00	15600.00	211754.88

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4 - Ethics & security

Ethics Issues Table

1. Human Embryonic Stem Cells and Human Embryos		Page
Does this activity involve Human Embryonic Stem Cells (hESCs)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve the use of human embryos?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
2. Humans		Page
Does this activity involve human participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve interventions (physical also including imaging technology, behavioural treatments, etc.) on the study participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve conducting a clinical study as defined by the Clinical Trial Regulation (EU 536/2014) ? (using pharmaceuticals, biologicals, radiopharmaceuticals, or advanced therapy medicinal products)	<input type="radio"/> Yes <input checked="" type="radio"/> No	
3. Human Cells / Tissues (not covered by section 1)		Page
Does this activity involve the use of human cells or tissues?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
4. Personal Data		Page
Does this activity involve processing of personal data?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve further processing of previously collected personal data (including use of preexisting data sets or sources, merging existing data sets)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is it planned to export personal data from the EU to non-EU countries? Specify the type of personal data and countries involved	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is it planned to import personal data from non-EU countries into the EU or from a non-EU country to another non-EU country? Specify the type of personal data and countries involved	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve the processing of personal data related to criminal convictions or offences?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
5. Animals		Page
Does this activity involve animals?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
6. Non-EU Countries		Page
Will some of the activities be carried out in non-EU countries?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
In case non-EU countries are involved, do the activities undertaken in these countries raise potential ethics issues?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is it planned to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is it planned to import any material (other than data) from non-EU countries into the EU or from a non-EU country to another non-EU country? For data imports, see section 4.	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is it planned to export any material (other than data) from the EU to non-EU countries? For data exports, see section 4.	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve low and/or lower middle income countries , (if yes, detail the benefit-sharing actions planned in the self-assessment)	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Could the situation in the country put the individuals taking part in the activity at risk?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
7. Environment, Health and Safety		Page

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Does this activity involve the use of substances or processes that may cause harm to the environment, to animals or plants.(during the implementation of the activity or further to the use of the results, as a possible impact) ? ☐ Yes ☒ No

Does this activity deal with endangered fauna and/or flora / protected areas? ☐ Yes ☒ No

Does this activity involve the use of substances or processes that may cause harm to humans, including those performing the activity.(during the implementation of the activity or further to the use of the results, as a possible impact) ? ☐ Yes ☒ No

8. Artificial Intelligence

Page

Does this activity involve the development, deployment and/or use of Artificial Intelligence? (if yes, detail in the self-assessment whether that could raise ethical concerns related to human rights and values and detail how this will be addressed). ☐ Yes ☒ No

9. Other Ethics Issues

Page

Are there any other ethics issues that should be taken into consideration? ☐ Yes ☒ No

I confirm that I have taken into account all ethics issues above and that, if any ethics issues apply, I will complete the ethics self-assessment as described in the guidelines [How to Complete your Ethics Self-Assessment](#)



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Ethics Self-Assessment

Ethical dimension of the objectives, methodology and likely impact

Explain in detail the identified issues in relation to:

- objectives of the activities (e.g. study of vulnerable populations, etc.)
- methodology (e.g. clinical trials, involvement of children, protection of personal data, etc.)
- the potential impact of the activities (e.g. environmental damage, stigmatisation of particular social groups, political or financial adverse consequences, misuse, etc.)

Remaining characters

4594

Compliance with ethical principles and relevant legislations

Describe how the issue(s) identified in the ethics issues table above will be addressed in order to adhere to the ethical principles and what will be done to ensure that the activities are compliant with the EU/national legal and ethical requirements of the country or countries where the tasks are to be carried out. It is reminded that for activities performed in a non-EU countries, they should also be allowed in at least one EU Member State.

Remaining characters

5000

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Security issues table

1. EU Classified Information (EUCI) ²		Page
Does this activity involve information and/or materials requiring protection against unauthorised disclosure (EUCI)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does this activity involve non-EU countries?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
2. Misuse		Page
Does this activity have the potential for misuse of results?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
3. Other Security Issues		Page
Does this activity involve information and/or materials subject to national security restrictions? If yes, please specify: (Maximum number of characters allowed: 1000)	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Are there any other security issues that should be taken into consideration? If yes, please specify: (Maximum number of characters allowed: 1000)	<input type="radio"/> Yes <input checked="" type="radio"/> No	

²According to the Commission Decision (EU, Euratom) 2015/444 of 13 March 2015 on the security rules for protecting EU classified information, "European Union classified information (EUCI) means any information or material designated by an EU security classification, the unauthorised disclosure of which could cause varying degrees of prejudice to the interests of the European Union or of one or more of the Member States".

³Classified background information is information that is already classified by a country and/or international organisation and/or the EU and is going to be used by the project. In this case, the project must have in advance the authorisation from the originator of the classified information, which is the entity (EU institution, EU Member State, third state or international organisation) under whose authority the classified information has been generated.

⁴EU classified foreground information is information (documents/deliverables/materials) planned to be generated by the project and that needs to be protected from unauthorised disclosure. The originator of the EUCI generated by the project is the European Commission.

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5 - Other questions

Information on the Researcher (future fellow)

1. Were you in the last 3 years in compulsory national service? ☐ Yes ☒ No

2. Did you spend time, in the last 3 years, on procedures for obtaining refugee status (according to the 1951 Geneva Refugee Convention and the 1967 Protocol) in a Member State or Associated Country to Horizon Europe? ☐ Yes ☒ No

3. Are you a national of a Member State or Associated Country? ☐ Yes ☒ No

Are you a long term resident of a Member State or Associated Country? ☐ Yes ☒ No

Other Questions

4. Is there a secondment envisaged in Part B of this proposal? ☒ Yes ☐ No

The following are not considered as secondments:

- outgoing phase of a Global Fellowship
- optional six-months placement in the non-academic sector
- short visits or field work

Total duration of the secondments (in months):

5. Is the proposal eligible for funding under the Euratom Research and Training Programme (ERTP)? Please see the Guide for Applicants for this call and https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/euratom-research-and-training-programme_en for more information. ☐ Yes ☒ No

Answer "Yes" only if all three conditions below are fulfilled:

- The proposal's research area is covered by the ERTTP
- The host organisation (and, if applicable, the Associated Partner for the additional Placement period) is/are established in a Member State or Associated Country to the ERTTP
- The researcher is a national or a long-term resident of a Member State or Associated Country to the ERTTP

6. For communication purposes only, the European Commission REA asks for permission to publish the name of the researcher (future fellow) should the proposal be retained for funding. Does the researcher (future fellow) give this permission? ☒ Yes ☐ No

7. Some national and regional public research funding authorities run schemes to fund MSCA applicants that score highly in the MSCA evaluation but which cannot be funded by the MSCA due to their limited budget. In case this proposal could not be selected for funding by the MSCA, do the researcher and supervisor consent to the European Commission disclosing to such authorities the results of its evaluation (score and ranking range) together with their names and contact details, non-confidential proposal title and abstract, proposal acronym, and host organisation? ☒ Yes ☐ No

