Postdoc Position

Self-organization of 3D embryonic organoids

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Self-organization in multicellular systems
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The early stages of mammalian development involve symmetry-breaking events through which a group of equivalent cells differentiate and undergo specific morphogenetic movements during a process known as gastrulation. Such a process can be recapitulated *in vitro* by culturing 3D aggregates of stem cells, eventually forming embryonic organoids called gastruloids. Despite this system has been extensively studied from a genetic point of view, the physical basis of its morphogenetic potential is still not understood. Guided by experimental results, the researcher will use an **agent-based simulation software including cell differentiation and mechanics** to simulate how local cell interactions can give rise to **polarized patterning and the concomitant elongation of the structure**. Simulations will be combined with **continuum hydrodynamic models** to bridge the gap between the cellular and tissue scales. The work is expected to motivate the design of new experiments in order to test the theoretical predictions.

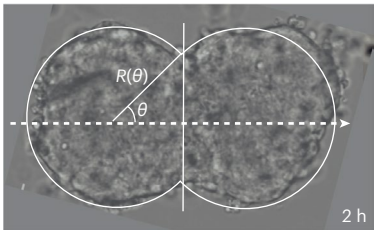
Expected profile of the applicant: Biophysicist, soft matter physicist, or applied mathematician with a strong interest in tissue morphogenesis.

Place: EMBL Barcelona & Universitat Politècnica de Catalunya (UPC), Barcelona (Spain).
Duration: 1 year (possible extension).
Deadline for application: **31st of January 2024.**

Applications: We invite applicants to submit to vikas.trivedi@embl.es or david.oriola@upc.edu:

- Curriculum Vitae (CV).
- Short letter describing prior research experience and current professional interests.
- Contact information of two references.

Informal inquiries are also welcome.



$$\dot{\theta} = \frac{2\cot\theta}{\tau}\left(\frac{R_0}{R(\theta)}\right)^3 [f(\theta) - \beta g(\theta)]$$