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Geometry-driven organisation in living matter

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The spontaneous generation of patterns and structures occurs in many living systems and is linked to biological form and function. Such processes often take place on domains which themselves evolve in time, and they can be guided by or coupled to geometrical features. The role of geometry in the self-organisation of functional structures however is not understood. I will present two biophysical examples that illustrate how geometry directs spatial organization across scales. I will discuss how boundary geometry controls a topological defect transition that guides lumen nucleation in embryonic development [1], and how shape can act as a form of memory in cell-cell signaling [2].

[1] Guruciaga et al. arXiv:2403.08710 (2024)
[2] Dullweber et al. arXiv:2402.08664v2 (2024)

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