"A self-organized vortex array of hydrodynamically entrained sperm cells"

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All are welcome to attend!

Abstract
Many patterns in biological systems depend on the exchange of chemical signals between cells. We report a spatio-temporal pattern mediated by hydrodynamic interactions. At planar surfaces spermatozoa self-organized into dynamic vortices resembling quantized rotating waves. These vortices formed an array with local hexagonal order. Introducing an order parameter that quantifies cooperativity, we found that the array appeared only above a critical sperm density. A model allowed us to estimate the hydrodynamic interaction force between spermatozoa to be \( \sim 0.03 \) pN. Thus, large-scale coordination of cells can be regulated hydrodynamically, without chemical signals being required.