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Active stochastic stress fluctuations in the cell cytoskeleton stir the cell and activate primary cilia CHRISTOPH F. SCHMIDT, Georg-August-Universitaet Goettingen, Third Institute of Physics - Biophysics, NIKTA FAKHRI, Massachusetts Institute of Technology, Department of Physics, CHRISTOPHER BATTLE, Georg-August-Universitaet Goettingen, Third Institute of Physics - Biophysics, CAROLYN M. OTT, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, ALOK D. WESSEL, Georg-August-Universitaet Goettingen, Third Institute of Physics - Biophysics, JENNIFER LIPPINCOTT-SCHWARTZ, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, FREDERICK C. MACKINTOSH, Vrije Universiteit Amsterdam, Department of Physics and Astronomy — Cells are active systems with molecular force generation that drives complex dynamics at the supramolecular scale. Much of cellular dynamics is driven by myosin motors interacting with the actin cytoskeleton. We discovered active random "stirring" driven by cytoplasmic myosin as an intermediate mode of transport, different from both thermal diffusion and directed motor activity. We found a further manifestation of cytoskeletal dynamics in the active motion patterns of primary cilia generated by epithelial cells. These cilia were thought to be immotile due to the absence of dynein motors, but it turns out that their anchoring deeper inside the cell in combination with the strongly fluctuating cortex results in clearly measurable non-equilibrium fluctuations.

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