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Abstract for an Invited Paper
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Cell polarity and shape sensing: how does a cell know its own shape?¹

BRIAN CAMLEY, Johns Hopkins University

Crawling eukaryotic cells are soft matter driven out of equilibrium by active forces - a great playground for physicists - but their physics also strongly constrains cell function. I will discuss the group's recent work on how reactions on the cell's surface - a model of cell polarity driven by the patterning of Rho GTPase proteins - can become sensitive to cell shape. This shape sensing can lead to surprising new behaviors, like migrating cells developing a spontaneous circular motion. This complex chemical reaction can, in some limits, be understood as minimizing a simple energy proportional to the perimeter of the protein domain on the cell membrane. I will also discuss how roughness in membrane shape can potentially distort shape sensing by leading to protein domains becoming trapped in local minima.

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