

Abstract Submitted  
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**Autophoresis in three dimensions** MACIEJ LISICKI<sup>1</sup>, University of Cambridge, United Kingdom, SHANG-YIK REIGH, Max Planck Institute for Intelligent Systems, Germany, ERIC LAUGA, University of Cambridge — Janus particles with the ability to move phoretically in self-generated chemical concentration gradients are model systems for active matter. Their motion typically consists of straight paths, with rotational diffusion being the dominant reorientation mechanism. We show theoretically that by a suitable surface coverage by activity and mobility, both translational and rotational motion can be induced in three dimensions. Resulting trajectories are generally helical, and their pitch and radius can be controlled by adjusting the angle between the translational and angular velocity. We construct a theoretical framework to calculate the resulting motion for an arbitrary coverage and introduce a simple intuitive patch model, which serves as a guide for designing arbitrary phoretic spheres.

<sup>1</sup>Also at: University of Warsaw

Maciej Lisicki  
University of Cambridge, United Kingdom

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