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Chemotaxis of Phoretic Swimmers SUROPRIYA SAHA, SRIRAM RAMASWAMY, Indian Institute of Science, Bangalore, RAMIN GLOESTANIAN, Rudolf Peierls Centre for Theoretical Physics, University of Oxford — An artificial phoretic swimmer in a uniform bath of reactant propels itself in a direction dictated by the polarity of the enzymatic and mobility patterning on its surface. We have have shown that a polar active particle of this type can also orient itself along an imposed gradient of reactant concentration. This amounts to a theoretical demonstration of a phoretic analogue of chemotaxis, that is, the ability of a self-propelled particle to align with respect to, and hence to move up or down, a chemical gradient. The nature of the chemotaxis depends on the shape of the particle, on the distribution of enzymatic sites on its surface, and on the surface mobility. We have also considered the type of motion that arises when the orientation time of the particle becomes comparable to the diffusion time of the cloud of reaction products around it. Lastly, we consider motion arising from the interaction of two or more such chemotactic particles.

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