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Chemotaxis and auto-chemotaxis of self-propelling artificial droplet swimmers[1] CHENYU JIN, CARSTEN KRUEGER, CORINNA MAASS, Max Planck Institute for Dynamics and Self-Organization — Chemotaxis and auto-chemotaxis are key mechanisms in the dynamics of micro-organisms, e.g. in the acquisition of nutrients and in the communication between individuals, influencing the collective behavior. However, chemical signalling and the natural environment of biological swimmers are generally complex, making them hard to access analytically. Simple experimental systems showing similar features could provide vital insights. We present such a swimmer system, as well as controlled assays to study chemotactic effects quantitatively and reproducibly. In our experiments, we let auto-chemotactic droplet swimmers pass through bifurcating microfluidic channels and record anticorrelations between the branch choices of consecutive droplets. We present an analytical model based on balancing stochastic forces versus a diffusing chemical gradient matching the experimental data.

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Chenyu Jin
Max Planck Institute for Dynamics and Self-Organization

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