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Collective Motion of Magnetotactic Bacteria

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Magnetotactic bacteria synthesize magnetic crystals in specialized organelles. This causes the cells to align with external magnetic fields. The movement of magnetotactic bacteria in applied magnetic fields has been studied previously, but only in the dilute limit in which cells do not interact. At much higher concentrations, hydrodynamic interactions and collisions can significantly alter the motion of individual cells as compared to their behaviour in isolation. These collective effects have not been previously studied in the case of magnetotactic bacteria. By tuning cell density and magnetic field, changes to cellular organization and movement are observed, as measured through microrheological and image analysis approaches.

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