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Understanding the spatial organization of bacteria

The spatial self-organization of bacteria can be understood by thinking of bacteria as self-propelled rods that interact by pushing each other. Despite the simplicity of the model, it is possible to show that the combination of these two ingredients, self-propulsion and volume exclusion, is enough to reproduce the phenomena observed in experiments: collective motion, clustering, and aggregation. Interestingly, the combination of self-propulsion and volume exclusion can induced a surprisingly rich variety of self-organized patterns which is not limited to the above mentioned patterns. As a proof of principles, it will be shown that when volume exclusion induces stagnation of cells, a new phenomenology driven by the jamming of cells emerges.