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Jamming and Localization of Interacting Run-and-Tumble Particles RICHARD BLYTHE, MARTIN EVANS, ALEXANDER SLOWMAN, University of Edinburgh — Certain species of bacteria, notably *Escherichia coli*, exhibit a characteristic run-and-tumble motion comprising a sequence of straight-line runs at constant velocity interspersed with tumble events that randomize the direction of motion. In a many-body setting, this nonequilibrium dynamics can generate the phenomenon of motility-induced phase separation, which is also seen for a wide variety of self-propelled particles more generally. Whilst the propensity of self-propelled particles to phase separate is understood at a mesoscopic level, the origin of this behaviour in the inelastic collisions between particles implied by the microscopic dynamics is not. Here we present exact results for run-and-tumble particles in one dimension that reveal a richly-structured stationary state that comprises a superposition of three distinct physical states whose relative weights vary with the run and tumble rates, namely a jammed state, a localized state and a delocalized state.

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