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Actin-mediated bacterial propagation as dissipative dynamics of F-actin concentration: onset of motion, comet profile, velocity fluctuations VINCENZO BENZA, Universita' dell'insubria — Bacterial motion under the action of an actin gel network is described in terms of the F-actin concentration dynamics driven by polymerization, elasticity, and coupling with the bacterium. An explicit formula for the velocity clarifies the role of the different factors contributing to propagation. As regards the onset of motion, we find that smaller ratios of the branching/nucleation rates give rise to an increasingly long buildup time before startup. In the cruise regime the linear growth of the comet length versus velocity is analytically shown and numerically verified; as the length increases the concentration maximum decreases. Both features have been observed in kinematics experiments [1]. By expanding our previous work [2], we show that a larger elasticity modulus makes a larger velocity but with a smaller contribution from the interface polymerization. At steady state we find two regimes: constant velocity when the branching rate dominates over the nucleation rate, intermittent velocity when the two rates are comparable. In this case the concentration profile does not display macroscopic fluctuations, but the distance of its maximum from the bacterium surface oscillates: this behavior has its counterpart in the intermittency of the cruise velocity. [1] F.S.Soo, J.A.Theriot, Biophysical Journal 89 :703-723 (2005). [2] V.G.Benza, arXiv:q-bio/0702061 (February 2007)

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