Abstract Submitted
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How Bacterial Population Soliton Waves Can Defeat a Funnel Ring[1] ROBERT AUSTIN, Princeton University, RYAN MORRIS, University of Edinburgh, AVERAGE PHAN, MATTHEW BLACK, KE-CHIH LIN, JULIA BOS, Princeton University — We have constructed using microfabrication a circular corral for bacteria made of rings of concentric funnels which channel motile bacteria outwards via non-hydrodynamic interactions with the funnel walls. Although initially bacteria do move rapidly outwards with the funnels, they are able with increasing cell density on the perimeter to defeat the physical constraints of the funnel by launching collective, soliton like waves of bacteria inwards against the funnel ring. We present the basic data and some non-linear modeling which can explain the basic way that bacterial population solitons propagate across a funnel landscape. There are three surprising aspects to the experiments: (1) The bifurcation of the population into motile bacteria which are pumped by the funnels and bacteria which are non-motile (i.e., not pumped); (2) The launching of a collective wave which rapidly circles the device and radiates inwards *against* the pumping action of the funnel; (3) the subsequent loss of motility by all the bacteria after this burst of very high motility.

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