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October 6, 2018

Dear PRX Editors,

We would like to submit the paper "On The Diffusion of Sticky Particles in 1-D" for consideration in PRX. In it we create a new paradigm for modelling complex flow, combining the simplest particle-based model for flow with the simplest particle-based model for attraction, the Symmetric Exclusion Process and the Ising model. A remarkable discovery is that this "Sticky Particle Model" has a nonequilibrium transition between two types of flow, something not generally believed impossible in 1D without long-range interactions or an external field. As with the SEP and Ising models, the simple nature of the model makes it applicable as a paradigm for a wide range of flow problem. We also demonstrate well-defined limiting behavior of the density and flow. Simple explanations of these observations escape us, but should open up the field to follow-up test and developments of overarching theories on nonequilibrium thermodynamics such as maximum entropy, maximum entropy production of maximum flow.

After introducing the model, we analyse it in depth with three different techniques: Monte Carlo simulation, Transition rate matrices, and mean field theory.

The paper has some history. We originally submitted to PRL where the referees felt we hadn't proved our case. We are confident in our results, but the refereeing at PRL made it clear that attempting to cram both simulation and mean field theory into a letter format could not be done in a clear manner.

Since the PRL submission, we developed the transition matrix approach which provides yet more evidence and explanation of the model. We are confident that this, and extended numerical evidence of the transition such as the fluctuation peak in 7 would convince the referees. For this reason, we choose to submit our more thorough exposition to PRX.