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Mutation at Expanding Front of Self-Replicating Colloidal Clusters HIDENORI TANAKA, Harvard University, ZORANA ZERAVCIC, ESPCI PSL Research University, MICHAEL BRENNER, Harvard University — We construct a scheme for self-replicating square clusters of particles in two spatial dimensions, and validate it with computer simulations in a finite-temperature heat bath. We find that the self- replication reactions propagate through the bath in the form of Fisher waves. Our model reflects existing colloidal systems, but is simple enough to allow simulation of many generations and thereby the first study of evolutionary dynamics in an artificial system. By introducing spatially localized mutations in the replication rules, we show that the mutated cluster population can survive and spread with the expanding front in circular sectors of the colony.

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