Interacting particle systems with mobility and demographic dynamics as biological models

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The behaviour of active matter has been intensively investigated in the last decades partly because of its many applications to living systems. In this work, we add stochastic birth-death dynamics to a system of particles with volume exclusion. This is a simple, but general biological ingredient which has not been studied in detail before. The number of particles in the system at long times depends on the birth and death rates, and on a parameter characterising the activity. We find liquid, solid and hexatic phases in the absence of activity . Which one of these phases is realised depends on the birth and death rates [1]. When self-propulsion is considered, we also observe these phases depending on the activity. we will also analyse what happens when there are two types of particles of different sizes. We will study the conditions to find coexistence.

[1] Almodvar, A., Galla, T., Lpez, C., *Liquid-hexatic-solid phases in active and passive Brownian particles determined by stochastic birth and death events.*, Phys. Rev. E , **106(5)**, 054130, 2022.