Evolutionary robotics for morpho-functional swarm robotics

We are looking for a Ph.D student to work on an ANR-funded multi-institution project “Morpho-functional Swarm Robotics” under the supervision of Prof. Nicolas Bredeche (http://pages.isir.upmc.fr/~bredeche/). You will participate to a swarm robotics project at the crossroad of evolutionary robotics and active matter. This exciting project explores both the physical and logical capabilities of small-scale robots (~2 cm in diameter) in order to design self-adaptive self-organizing robot swarms. The goal is to exploit physical interactions between robots to perform collective behaviours using minimal logical computation (e.g. changing global alignment by modulating only the shape or the speed of the robots, collective transport through synchronised collision events, etc.). You will design learning and exploration algorithms for large swarm robotics experiments, using both simulation and real robots. Your task will be to develop tools to explore the space of collective behaviours using exploration algorithms (QD, Map-Elites, ...) and to design new lifelong learning algorithms for swarm robotics (embodied ER, social learning, multi-agent on-line learning). Skills: previous experience in Evolutionary Robotics or Artificial Life. Excellent skills in experimental design, experimental practice and rigorous data analysis. Excellent programming skills, preferably in C++ and Python. Previous experience with real robots (e.g. Kilobots) is welcome, but not mandatory.