

# Modeling diffusion and search in crowded environments by cellular automata and fractional Brownian motion

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Intracellular transport takes place in crowded environments featuring complex interactions between moving agents, obstacles and targets. In my talk I present two examples of stochastic modeling of diffusion and search in such environments: First I show how to implement anomalous diffusion modeled by generalised Langevin dynamics in a Lattice Gas Cellular Automaton (LGCA). LGCAs have the advantage that they can be efficiently simulated on a computer. Our approach thus paves the way to study moving agents with memory plus complicated interactions numerically in LGCA schemes [1]. Secondly, I present results from computer simulations for search in a field of targets by fractional Brownian motion. Our results show an intricate dependence of the search efficiency on important physical quantities like the density of targets, the perception radius of the searcher and the average displacement of the searcher.

[1] J.M.Nava-Sedeno et al., Sci. Rep. **7**, 16952 (2017)

[2] S.M.J.Khadem, S.H.L.Klapp, R.Klages, ms. in preparation (2019)