# The Kuramoto-Vicsek model

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The Vicsek model is perhaps the most famous model in active matter studies. One can see it as an XY model where the spins move off-lattice at constant speed. This forces the model out-of-equilibrium, and allows for true long-range polar order in 2D. The Vicsek model is also well-known for exhibiting spontaneous segregation into dense and ordered structures traveling in a sparse gas.

There is one obvious way to introduce chirality in the Vicsek model: endow each constant-speed self-propelled particle with an intrinsic frequency/chirality. In continuous time, the equation governing the polarity of particles then becomes akin to that defining the famous Kuramoto model for synchronization, but for the fact that coupling is local in physical space.

This Kuramoto-Vicsek model is an ideal playground to study (dry) chiral aligning active matter. Over the last few years, we have uncovered quite a number of its remarkable properties. This talk will try to present them in a synthetic way.