Waves and turbulence in active polar fluids

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Dense suspension of active particles such as fish schools or a bacteria colony performs complex collective motion, which is also known as active turbulence. In this talk, we will first present minimalistic models to investigate the interplay between a growing bacteria colony and coherent structures arising from active turbulence[1]. Motivated by our results, we then present a detailed numerical study of the more generic Simha-Ramaswamy[2] model of an active polar suspension. We numerically show presence of waves, consistent with the linear stability analysis, and also find turbulent regimes.

References:

[1] R. Chatterjee, A.A. Joshi, and P. Perlekar, Phys. Rev. E 94, 022406 (2016).
[2] R.A. Simha and S. Ramaswamy, Phys. Rev. Lett. 89, 058101 (2002).