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Microscopic Theory for Hyperuniformity and Singular Density Fluctuations in Chiral Active Fluids

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Chiral active matter is a class of active matter systems. This system consists of the components which perform the chiral motion. Most active matter systems, including polar fluids and active nematic, exhibit giant density fluctuations at large scales. Recently, it was found that the chiral fluids show the suppression of density fluctuations at large scales, in two-dimension. This phenomenon is called hyperuniformity. The hyperuniformity in chiral active fluids has been observed numerically and experimentally. However, the theoretical description from microscopic viewpoints is still absent. Thus, we developed a microscopic theory for the hyperuniformity in two-dimensional chiral active fluids starting from a simplest particle model. We also investigated a three-dimensional case and found that this system exhibits a singular density correlation. In this talk, I plan to talk about these results.