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Rheology of a Chiral Active System

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We investigate a two-dimensional chiral fluid composed of Brownian disks interacting via a Lennard-Jones potential and subjected to a nonconservative transverse force, mimicking colloids spinning at a given rate. Focusing on the liquid phase, characterized by rotating hexatic patches, we demonstrate that increasing chiral activity modifies the system's effective temperature. In the solid phase, the introduction of chiral activity alone induces melting, driving a transition from a yielding regime to Newtonian-like behavior.
Additionally, under sufficiently large shear rates, the particles organize into pronounced string-like flows, where layers of particles slide past each other along the shear direction.
This string formation is further enhanced when the rotation of the particles opposes the shear direction.
These findings clarify how chiral activity influences the rheological behavior of particle assemblies, advancing our understanding of flow dynamics in active chiral fluids.

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