Spin-locking domains in rotating polariton condensates

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The combined effects of internal spin dynamics, interactions, and rotational motion shape a wide range of behaviors in systems as varied as quantum materials, ultracold atomic gases, and astrophysical objects. In this work, we explore how similar mechanisms arise in a photonic quantum fluid made of exciton-polaritons confined in semiconductor microcavities. In this setting, the internal spin structure of the fluid is influenced by an effective magnetic field linked to the direction of light propagation. By introducing rotational flow at the core of the condensate, we uncover how this motion modifies the internal field landscape, giving rise to new spin behaviors. In particular, we observe the emergence of ring-shaped patterns that mark transitions between regions of opposite spin orientation. These features reflect a unique balance between spin effects, interactions, and rotation, and open new possibilities for shaping complex patterns and textures in driven quantum fluids of light.

References

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