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Mean field theory for the domain formation in a spin-1 condensate WENXIAN ZHANG, DUANLU ZHOU, L. YOU, School of Physics, Georgia Institute of Technology, Atlanta, Georgia 30332-0430, USA — Spin domains were recently observed in the off-equilibrium dynamics of a large condensate of ⁸⁷Rb atoms confined in a cigar shaped optical trap¹. For a two component condensate, the number of atoms within each component is conserved. The dynamics of domain formation has been investigated in detail using the mean field theory². For a spin-1 condensate (with ⁸⁷Rb or ²³Na atoms), the number of atoms for each component varies due to spin exchange collisions $2|F = 1, m_F = 0\rangle \leftrightarrow |F = 1, m_F = -1\rangle + |F = 1, m_F = 1\rangle$. In this study, we investigate the effect of such exchange interactions on the dynamics of domain formation in a spin-1 condensate. Using both analytic calculations for a homogeneous condensate and numerical simulations for a trapped condensate, we provide a detailed understanding of the stable and unstable regions of the offequilibrium dynamics. We also address the important role of an external magnetic field.

¹Private communications with M. -S. Chang and M. S. Chapman. ²K. Kasamatsu and M. Tsubota, Phys. Rev. Lett. **93**, 100402 (2004).

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