Nambu-Goldstone modes in segregated Bose-Einstein condensates HIROMITSU TAKEUCHI, Osaka City Univ, KENICHI KASAMATSU, Kinki University — Nambu-Goldstone modes in immiscible two-component Bose-Einstein condensates are studied theoretically.[1] In a uniform system, a flat domain wall is stabilized and then the translational invariance normal to the wall is spontaneously broken in addition to the breaking of two U(1) symmetries in the presence of two complex order parameters. We clarify the properties of the low-energy excitations and identify that there exist only two Nambu-Goldstone modes: an in-phase phonon with a linear dispersion and a ripplon with a fractional dispersion. The ripplon in the low-energy limit is considered as a linear combination of a relative rotation of phases of order parameters and a transverse shift of the domain wall. The signature of the characteristic dispersion can be verified in segregated condensates in a harmonic potential.

1 Hiromitsu Takeuchi and Kenichi Kasamatsu, Phys. Rev. A **88**, 043612 (2013)

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