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Finite-temperature Effects on Producing Smooth Flow in a Racetrack Atom Circuit[1] BENJAMIN ELLER, OLATUNDE OLADEHIN, Georgia Southern University, CHARLES CLARK, JQI and NIST, MARK EDWARDS, Georgia Southern University — We studied smooth flow produced by stirring an ultracold atom circuit consisting of a gaseous Bose–Einstein condensate (BEC) confined in a "racetrack" potential at finite temperature. The BEC is assumed to be strongly confined in a horizontal plane by a vertical harmonic trap and, within this plane, subjected to an arbitrary two–dimensional potential. The racetrack potential is made up of two straight parallel channels connected on both ends by semicircular channels of the same width and (energy) depth as the straightaways. We used the Zaremba–Nikuni–Griffin model to simulate the behavior of the BEC and noncondensate in this potential when stirred by a rectangular paddle at various speeds and barrier heights. We compare the amount of flow produced by stirring under these conditions with the flow produced under the same conditions but at zero temperature. We discuss how a simple model which predicts the flow produced by stirring at zero temperature could be modified for finite temperature.

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