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Counterflow and paired superfluidity in one-dimensional Bose mixtures ANZI HU, LUDWIG MATHEY, Joint Quantum Institute, University of Maryland and National Institute of Standard and Technology, Gaithersburg, MD 20899, IPPEI DANSHITA, Department of Physics, Faculty of Science, Tokyo University of Science, Shinjuku-ku, Tokyo 162-8601, Japan, CARL WILLIAMS, CHARLES CLARK, Joint Quantum Institute, University of Maryland and National Institute of Standard and Technology, Gaithersburg, MD 20899 — We study the quantum phases of 1D Bose mixtures using Luttinger liquid theory and the numerical method,TEBD. We consider a binary mixture with both repulsive and attractive inter-species interaction. We first present the phase diagram for a homogeneous system. In particular, we study the paired superfluid(PSF) and counterflow superfluid(CFSF) phases at different filling and hopping energies,as well as parameter regions where PSF/CFSF coexist with charge density wave (CDW) order.Then we address the question of how these phases can be created and detected in the presence of a trap. We present measurable quantities, such as time-of-flight images and noise correlations. We also suggest applying a Feshbach ramp and $\pi/2$ pulse followed by Bragg spectroscopy as possible ways of detection.

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