

Abstract Submitted
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Probing phase fluctuations in a quasi-2D Bose gas by free expansion¹ JAE-YOON CHOI, SANG WON SEO, WOO JIN KWON, YONG-IL SHIN, Seoul National University, QUANTUM GAS RESEARCH GROUP TEAM — We measure the power spectrum of the density distribution of a freely expanding quasi-2D Bose gas, where irregular density modulations gradually develop due to initial phase fluctuations in the sample [1]. The spectrum has an oscillatory shape, where the peak positions are found to be independent of temperature and show scaling behavior in the course of expansion. The relative intensity of phase fluctuations is estimated from the normalized spectral peak strength and observed to decrease at lower temperatures, confirming the thermal nature of the phase fluctuations. Using the time evolution of the power spectrum, we investigate the relaxation dynamics of a sample prepared in a nonequilibrium state. We will also discuss our recent experiments where we detect thermally activated vortices with clear density-depleted cores and reveal the pairing of vortices in a 2D degenerate Bose gas [2].

[1] J. Choi, S. W. Seo, W. J. Kwon, and Y. Shin, Phys. Rev. Lett. 109, 125301 (2012).

[2] J. Choi, S. W. Seo and Y. Shin, arXiv:1211.5649 (2012).

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