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Unification of BKT and BEC Phase Transitions in a Trapped Two-Dimensional Bose Gas RICHARD FLETCHER, MARTIN ROBERT-DE-SAINT-VINCENT, JAY MAN, NIR NAVON, ROBERT SMITH, KONRAD VIEBAHN, ZORAN HADZIBABIC, University of Cambridge — We study the critical point for the emergence of coherence in a harmonically trapped two-dimensional (2d) Bose gas with tuneable interactions. Over a wide range of interaction strengths we find excellent agreement with predictions based on the Berezinskii-Kosterlitz-Thouless (BKT) theory of 2d superfluidity. This allows us to quantitatively show, without any free parameters, that the interaction-driven BKT transition smoothly converges onto the purely statistical Bose-Einstein condensation (BEC) transition in the limit of vanishing interactions.

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