

Abstract Submitted
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Can a Bose gas be saturated? NAAMAN TAMMUZ, ROBERT SMITH, ROBERT CAMPBELL, SCOTT BEATTIE, STUART MOULDER, University of Cambridge, UK, JEAN DALIBARD, CNRS, UPMC Ecole Normale Supérieure, ZORAN HADZIBABIC, University of Cambridge, UK — In Einstein's textbook picture of an ideal gas, Bose-Einstein condensation is driven by purely statistical saturation of the excited states of the system. Experiments on dilute ultracold atomic gases are celebrated as realizations of Bose-Einstein condensation in close to its purely statistical form. Here we scrutinise this point of view using an ultracold gas of potassium (^{39}K) atoms, in which the strength of interactions can be tuned via a Feshbach scattering resonance. We first show that under typical experimental conditions a partially condensed atomic gas strongly deviates from the textbook concept of a saturated vapour. We then use measurements at a range of interaction strengths and temperatures to extrapolate to the non-interacting limit, and prove that in this limit the behaviour of a Bose gas is consistent with the saturation picture.

Naaman Tammuz
University of Cambridge, UK

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