Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Can three-body recombination purify a quantum gas? LENA DOGRA , JAKE GLIDDEN, CHRISTOPH EIGEN, TIMON HILKER, University of Cambridge, ERIC CORNELL, JILA, NIST and University of Colorado, Boulder, ROBERT SMITH, University of Oxford, ZORAN HADZIBABIC, University of Cambridge — While three-body recombination in quantum gases is traditionally associated with heating, it was recently observed that it can also cool some specific systems. We show that three-body loss in a partially condensed 3D homogeneous Bose gas could even lead to purification of the sample, meaning the reduction of the entropy per particle and the increase of the condensed fraction. This phenomenon is a consequence of two quantum-statistical effects - the saturation of the thermal component in a partially condensed gas and the quantum statistics of three-body collisions. We discuss the theoretical origin of this effect and the feasibility of its experimental realisation.

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Date submitted: 14 May 2019 Electronic form version 1.4