Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Transient supersolid properties in an array of dipolar quantum droplets FABIAN BOETTCHER, JAN-NIKLAS SCHMIDT, MATTHIAS WENZEL, JENS HERTKORN, MINGYANG GUO, TIM LANGEN, TILMAN PFAU, University of Stuttgart, 5. Physikalisches Institut and IQST — We study theoretically and experimentally the emergence of supersolid properties in a dipolar Bose-Einstein condensate. The theory reveals a ground state phase diagram with three distinct regimes - a regular Bose-Einstein condensate, incoherent and coherent arrays of quantum droplets. The coherent droplets are connected by a finite superfluid density background, which leads - in addition to the periodic density modulation - to a robust phase coherence throughout the whole system. We further theoretically demonstrate that we are able to dynamically approach the ground state in our experiment and that its lifetime is only limited by three-body losses. Experimentally we probe and confirm the signatures of the phase diagram by observing the in-situ density modulation as well as the phase coherence using matter wave interference.

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Date submitted: 30 Jan 2019 Electronic form version 1.4