Abstract Submitted
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Phase Separation and Dynamics of Trapped Two-component Bose-Einstein condensates[1] NP PROUKAKIS, KL LEE, M EDMONDS, I-K LIU, Joint Quantum Centre (JQC) Durham-Newcastle, Newcastle University, UK, NB JORGENSEN, L WACKER, JJ ARLT, Institut for Fysik og Astronomi, Aarhus Universitet, Aarhus C, Denmark — Two-component Bose-Einstein condensates (BECs) are an attractive system to study the non-equilibrium dynamics of interacting quantum gases. We recently formulated [1] a self-consistent kinetic model to study such systems at finite-temperature, where both components are partially-condensed. The BECs and the thermal atoms are coupled together through both the mean-field interactions and all possible collisional processes. We demonstrate the potential dominance of an energy-conserving exchange collision involving a BEC atom and a thermal atom from different components, and discuss the control of the hydrodynamicity through variations of temperature, trap frequencies and trap geometries [1]. Numerically analysing the miscibility-immiscibility phase diagram for the trapped 87Rb-39K experimental system [2], we demonstrate deviations from the simple (homogeneous) interaction strength criterion ($g_{12}^2/g_{11}g_{22} = 1$), with the transition boundary depending on the BEC atom numbers. We propose the experimental mapping of this boundary by monitoring the damping rate of the dipole oscillations, supported by detailed numerical simulations at zero and finite temperatures. [1] Edmonds et al., PRA 91,011602(R) (2015); ibid. PRA 92,063607 (2015) [2] Wacker et al., PRA 92,053602 (2015)

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