Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Emergence of striped states in quantum ferrofluids[1] ANTUN BALAZ, Institute of Physics Belgrade, Serbia, AXEL PELSTER, Physics Department and Research Center OPTIMAS, Technical University of Kaiserslautern, Germany — In the recent experiment [1], striped states in a many-body system of tilted dipoles were observed in a quantum ferrofluid of a strongly dipolar BEC of dysprosium, leading to a formation of atomic droplets. In Ref. [2] it was demonstrated that the stability of such droplets is due to a quantum fluctuation correction of the ground-state energy [3, 4]. Here we extend this previous theoretical description and develop a full Bogoliubov-Popov theory, which also takes into account the condensate depletion due to quantum fluctuations. We apply our novel approach to study in detail the emergence of striped states and their properties. To this end we perform extensive numerical simulations and determine how the critical tilting angle depends on both the atom number and the trap geometry. Our investigations turn out to be relevant for extracting the yet unknown s-wave background scattering length of dysprosium from the experiments of Ref. [1].
[1] M. Wenzel, et al., Phys. Rev. A **96**, 053630 (2017).
[2] L. Chomaz, et al., Phys. Rev. X **6**, 041039 (2016).
[3] T. D. Lee, et al., Phys. Rev. **106**, 1135 (1957).
[4] A. R. P. Lima and A. Pelster, Phys. Rev. A **84**, 041604(R) (2011); Phys. Rev. A **86**, 063609 (2012).

[1]ON171017 and BEC-L by Serbian Ministry of Education, Science and Technological Development; BEC-L by DAAD; SFB/TR49 and SFB/TR185 by DFG

Antun Balaz
Institute of Physics Belgrade, Serbia

Date submitted: 25 Jan 2018 Electronic form version 1.4