

Title: Self-bound droplets of a dipolar Bose-Einstein condensate

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Abstract:

Recent experiments with Bose-Einstein condensates of dysprosium [1] and erbium [2] atoms have observed the formation of droplets that can preserve their form, even in the absence of any external confinement [3]. These droplets occur when the long-ranged dipole-dipole interaction between the atoms dominates over the short-ranged contact interaction. In this regime meanfield theory predicts that the condensate is unstable to collapse, however the Lee-Huang-Yang corrections to the meanfield energy [3] can stabilize the system as one or many finite sized droplets. I will discuss our current understanding of these droplets and their properties.

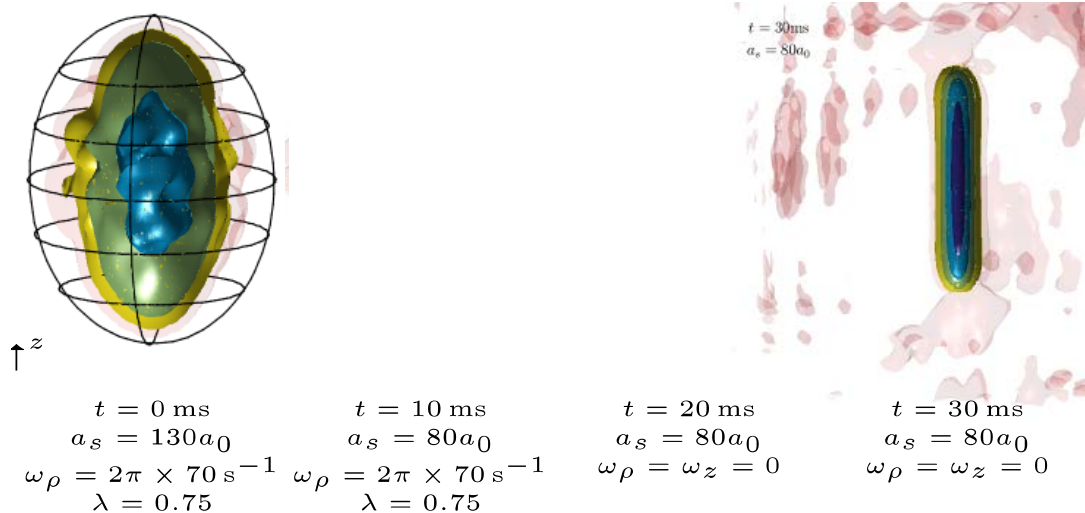


Figure: formation dynamics of a self-bound droplet from Ref. [4]

- [1] H. Kadau, M. Schmitt, M. Wenzel, C. Wink, T. Maier, I. Ferrier-Barbut, and T. Pfau, *Nature* **530**, 194 (2016)
- [2] L. Chomaz, S. Baier, D. Petter, M. J. Mark, F. Wächtler, L. Santos, and F. Ferlaino, *Phys. Rev. X* **6**, 041039 (2016)
- M. Schmitt, M. Wenzel, F. Böttcher, I. Ferrier-Barbut, and T. Pfau, *Nature* **539**, 259 (2016).
- [3] T. D. Lee, K. Huang, and C. N. Yang, *Phys. Rev.* **106**, 1135 (1957)
- [4] D. Baillie, R. M. Wilson, R. N. Bisset, and P. B. Blakie, *Phys. Rev. A* **94**, 021602(R) (2016).