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Crystallization of a dilute atomic dipolar condensate RUSSELL BISSET, INO-CNR BEC Center and Dipartimento di Fisica, Universit di Trento, BLAIR BLAKIE, University of Otago, New Zealand — A recent experiment found that a dilute BEC of highly-magnetic dysprosium atoms may spontaneously break up into a crystal of droplets, a process reminiscent of the Rosensweig instability [ArXiv:1508.05007]. We dynamically simulate this scenario and find that the standard dipolar Gross-Pitaevskii equation (GPE) cannot explain such a droplet crystal. Indeed, the GPE predicts too much heating during the violent droplet formation, and a droplet lifetime that is much shorter than observed in the experiment. We investigate the requisite properties of the unknown stabilization mechanism, and find that an effective repulsive interaction with a higher order density dependence than the usual two-body interactions is required to quantitatively reproduce the experimental results.

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