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Effects of magnetic dipole-dipole interactions in Bose-Einstein condensates: geometry and stability[1] ABRAHAM OLSON, YONG CHEN, Purdue University — Under normal conditions, the dominant atom-atom interaction in Bose-Einstein condensates (BECs) is the isotropic, short-range, s-wave scattering. With Feshbach resonances, those interactions can be tuned to near zero, allowing for the study of the anisotropic and long-range magnetic dipole-dipole interaction (MDDI). Motivated by the recent developments in this area, we study MDDI effects for ^{52}Cr and various alkali atomic species which have stable BEC. We employ a variational calculation to model the MDDI effects on the BEC both in static and dynamic situations. With this model, we reproduce the MDDI effects that have been experimentally observed in ^{7}Li and ^{52}Cr. In addition, we present experimentally realizable predictions for other alkali species. As the theoretical understanding and experimental investigations of MDDI effects on BECs are only growing, these results should provide a helpful guide for further exploration.

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