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Half-Quantum Vortex Molecules in a Binary Dipolar Bose Gas RYAN WILSON, Department of Physics, The United States Naval Academy, Annapolis, MD 21402, USA, WILBUR SHIRLEY, Department of Physics, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801, USA, BRANDON ANDERSON, CHARLES CLARK, Joint Quantum Institute, National Institute of Standards and Technology and the University of Maryland, College Park, Maryland 20742, USA — We discuss the ground state phases of a rotating two-component, or binary Bose-Einstein condensate, wherein one component possesses a large permanent magnetic dipole moment. A variety of non-trivial phases emerge in this system, including a half-quantum vortex (HQV) chain phase and a HQV molecule phase, where HQVs bind at short distances. We attribute these phases to the development of a minimum in the HQV interaction potential, which emerges without coherent coupling or attractive interactions between the components. Thus, we show that the presence of dipolar interactions in this system provides a unique mechanism for the formation of HQV molecules and results in a rich ground state phase diagram.

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