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Ground state phases of a quasi-2D BEC of rigid rotor molecules via Bogoliubov mean-field theory[1] NATHANIEL CHAPMAN, Department of Physics and Astronomy, Western Washington University, Bellingham, WA, SETH RITTENHOUSE, RYAN WILSON, Department of Physics, United States Naval Academy, Annapolis, MD, BRANDON PEDEN, Department of Physics and Astronomy, Western Washington University, Bellingham, WA — We investigate the quadrupolar properties of the ground state and low-energy excitations of a Bose-Einstein condensate of rigid rotor molecules confined harmonically in two dimensions. A gradient field is applied that induces molecular quadrupole moments, and the molecules interact via quadrupole-quadrupole forces. Via a Bogoliubov mean-field analysis, we identify a second-order phase transition between liquid-crystal-like uniaxial and biaxial nematic phases driven by the strength of the quadrupolar interactions and associated with the spontaneous symmetry-breaking of azimuthal symmetry in the plane. We investigate the stability of these phases by way of the dispersion relations of the low-energy excitations.

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