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**Ground state phases of a quasi-2D BEC of rigid rotor molecules via Bogoliubov mean-field theory**[1] NATHANIEL CHAPMAN, Dept. of Physics Astronomy, Western Washington University, SETH RITTENHOUSE, Physics Department, United States Naval Academy, BRANDON PEDEN, Dept. of Physics Astronomy, Western Washington University — 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 interactions. 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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Brandon Peden
Western Washington University

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