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Anisotropic superfluidity in a dipolar Bose Gas RYAN WILSON, JILA, NIST and Department of Physics, University of Colorado, Boulder, Colorado 80309, USA, CHRIS TICKNOR, Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA, JOHN BOHN, JILA, NIST and Department of Physics, University of Colorado, Boulder, Colorado 80309, USA — We study the superfluid character of a dipolar Bose-Einstein condensate (DBEC) in a quasi-two dimensional (q2D) geometry. In particular, we allow for the dipole polarization to have some non-zero projection into the plane of the condensate so that the effective interaction is anisotropic in this plane, yielding an anisotropic dispersion for propagation of quasiparticles. By performing direct numerical simulations of a probe moving through the DBEC, we observe the sudden onset of drag or creation of vortex-antivortex pairs at critical velocities that depend strongly on the direction of the probe's motion. This anisotropy emerges because of the anisotropic manifestation of a roton-like mode in the system.

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