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Biaxial nematic phases in ultracold dipolar Fermi gases BENJAMIN FREGOSO, KAI SUN, EDUARDO FRADKIN, BENJAMIN LEV, University of Illinois at Urbana-Champaign — Ultracold dipolar Fermi gases represent a relatively unexplored, strongly correlated system arising from long-range and anisotropic interactions. We demonstrate the possibility of a spontaneous symmetry breaking biaxial phase in these systems, which may be realized in, e.g., gases of ultracold polar molecules or strongly magnetic atoms. This biaxial nematic phase is manifest in a distortion of the Fermi surface perpendicular to the axis of polarization, and is a phase distinct from the previously discussed uniaxial distortion caused by any non-zero external polarizing field. We describe these dipolar interaction induced phases using Landau Fermi liquid theory and point to possible light scattering measurements that could detect these strong dipolar effects in degenerate Fermi gases.

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