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Emergent Weyl excitations in systems of polar particles SERGEY SYZRANOV, MICHAEL WALL, BIHUI ZHU, VICTOR GURARIE, ANA MARIA REY, JILA and Physics Department, Univ of Colorado - Boulder — Systems with Weyl quasiparticle dispersion have been predicted to display a plethora of novel fascinating phenomena: chiral anomaly, topologically protected Fermi arcs on the surfaces, non-Anderson disorder-driven transitions, etc. Over the last several years enormous research efforts have been directed at finding new Weyl semimetals in solid-state systems and ways to realise them in ultracold atomic gases. We demonstrate that excitations with Weyl dispersion generically exist in three-dimensional systems of polar particles in the presence of magnetic field. They emerge due to the dipolar-interaction-induced transitions between the $J = 0$ and $J = 1$ angular-momentum states of the particles. Also, we calculate the quasiparticle spectra microscopically for systems of alkaline-earth atoms that can be realised experimentally and suggest a Ramsey-spectroscopy protocol for observing Weyl excitations in them.

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