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Spontaneous interlayer superfluidity in bilayer systems of cold polar molecules[1] ROMAN LUTCHYN, ENRICO ROSSI, SANKAR DAS SARMA, University of Maryland — Quantum degenerate cold-atom gases provide a remarkable opportunity to study strongly interacting systems. Recent experimental progress in producing ultracold polar molecules with a net electric dipole moment opens up new possibilities to realize novel quantum phases governed by the long-range and anisotropic dipole-dipole interactions. In this work we predict the existence of experimentally observable novel broken-symmetry states with spontaneous interlayer coherence in cold polar molecules. These exotic states appear due to strong repulsive interlayer interactions and exhibit properties of superfluids, ferromagnets and excitonic condensates.

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