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Quasi-two-dimensional fermionic dipolar gases in the Hartree-Fock approximation: band renormalization, inter-subband excitons and the liquid-solid phase diagram MEHRTASH BABADI, EUGENE DEMLER, Department of Physics, Harvard University, Cambridge, Massachusetts 02138, USA — We study quasi-two-dimensional systems of fermionic dipolar gases in the Hartree-Fock approximation for various trap frequencies and dipolar interactions at finite temperatures and evaluate the energy dispersions of the renormalized subbands. We also study the inter-subband excitation spectrum of the system in the Time-Dependent Hartree-Fock approximation and predict the energy absorption rates in lattice modulation spectroscopy experiments. It is shown that the spectrum consists of inter-subband particle-hole excitation continuums as well as excitonic modes, and that their observation is highly likely in current experiments. Finally, we calculate the liquid-solid phase diagram of the system and find novel features such as multiple crystalline orders and re-entrant crystallization.

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