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Transport in two-dimensional disordered semimetals MICHAEL KNAP, Harvard University, JAY D. SAU, University of Maryland, BERTRAND I. HALPERIN, EUGENE DEMLER, Harvard University — We theoretically study transport in two-dimensional semimetals. Typically, electron and hole puddles emerge in the transport layer of these systems due to smooth fluctuations in the potential. We calculate the electric response of the electron-hole liquid subject to zero and finite perpendicular magnetic fields using an effective medium approximation and a complimentary mapping on resistor networks. In the presence of smooth disorder and in the limit of weak electron-hole recombination rate, we find for small but finite overlap of the electron and hole bands an abrupt upturn in resistivity when lowering the temperature but no divergence at zero temperature. We discuss how this behavior is relevant for several experimental realizations and introduce a simple physical explanation for this effect.

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