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Lifshitz transition in high magnetic fields in UPt_2Si_2: Magnetoresistivity, Hall effect, magnetostriction and Fermi surface S. SULLOW, D. SCHULZE GRACHTRUP, N. STEINKI, Institute of Physics of Condensed Matter, TU Braunschweig, D-38106 Braunschweig, Germany, Z. CAKIR, G. ZWICKNAGL, Institute of Mathematical Physics, TU Braunschweig, D-38106 Braunschweig, Germany, I. SHEIKIN, Laboratoire National des Champs Magnetiques Intenses, F-38042 Grenoble, France, M. JAIME, National High Magnetic Field Laboratory, Los Alamos National Lab., Los Alamos, NM, USA, J. A. MYDOSH, Kamerlingh Onnes Laboratory, Leiden University, 2300RA Leiden, The Netherlands — We have measured the magnetoresistivity and Hall effect of single crystalline UPt_2Si_2 in DC magnetic fields up to 35 T at temperatures down to 50 mK. Moreover, we have carried out magnetostriction measurements in pulsed magnetic fields up to 55 T for temperatures down to 1.5 K. For the magnetic field applied along the c axis we observe strong changes in the Hall effect at the previously established field induced phase boundaries AFM I $\leftrightarrow$ III and III $\leftrightarrow$ V (see Ref. [1]). From a detailed analysis of the Hall effect, we find evidence for topological changes of the Fermi surface due to at least one Lifshitz transition. Furthermore, in the magnetoresistivity and magnetostriction data we find a distinct history dependent anomaly within phase III, indicative of a first order phase transition. We relate our findings to band structure calculations carried out under consideration of the concept of a dual nature of the uranium $5f$ electrons with different degrees of localization.
[1] D. Schulze Grachtrup et al., Phys. Rev. B **85** (2012) 054410

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