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Berry's phase observed in the ordered state of Fe(Se,S) SHIGERU KASAHARA, T. YAMASHITA, Y. SHIMOYAMA, T. WATASHIGE, Y. MATSUDA, Kyoto University, J. BÉARD, M. NARDONE, W. KNAFO, LNCMI-Toulouse, M.D. WATSON, N.R. DAVIS, A.I. COLDEA, Univ. of Oxford, M. SUZUKI, R. ARITA, RIKEN, H. IKEDA, Ritsumeikan Univ., T. SHIBAUCHI, The Univ. of Tokyo — Among iron-based superconductors, FeSe offers a unique platform in that it exhibits a nematically ordered phase without long-range magnetic ordering. Several experiments have shown that the low-temperature Fermi surface of FeSe consists only of very small, shallow pockets [1-3]. Tuning the ground state via isoelectronic chemical substitution provides an ideal way to solve the puzzles regarding the nematic ordering in this material. Here, by using ultra-high magnetic fields up to $\sim 90\,\mathrm{T}$, we report observations of Shubnikov-de Haas (SdH) oscillations in isoelectronically substituted Fe(Se,S). For the smallest pocket of $\sim 0.2\%$ of the Brillouin-zone, we observe non-zero π Berry's phase shift in the SdH oscillations. Our results indicate presence of Dirac cone, which would be a key to understand the mechanism of the nematic ordering in this system.
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