MSP 10 P **HIGH-FIELDS LONGITUDINAL HALL EFFECT IN Bi BICRYSTALS WITH NANO-WIDTH SUPERCONDUCTING CRYSTALLITE INTERFACES**

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Recent experimental studies of bismuth in strong magnetic fields directed along highest-symmetry trigonal axis C_3 show a number of surprising results related to carriers interactions in the ultra quantum limit (UQL) that occurs at B ≥ 9T [1-3]. These results suggest possible transitions to a collective state with novel quantum properties in high magnetic fields where *surface*/interface states play very important roles. We found that in a magnetic field directed along the trigonal axis of crystalline blocks, the spectrum of longitudinal Hall quantum oscillations (LHQO) of small disorientation angle (SDA) bicrystals of inclination type is complex and contains frequencies from the FS of crystallites and interfaces. Above 2T, the oscillation peaks take an unusual configuration and their position is essentialy shifted from of the oscilation maxima of Hall resistivity of elemental Bi as well as of magnetoresistanse in both bicrystals and single crystalline samples. Between the peaks, along with minima in magnetoresistance, a number of Hall plateaus (~ 3T, ~ 6T, ~ 15T) were found, including two below the carrier quantum limit and one centered at 15T after UQL for the holes. If Hall potential contacts are adjusted outside of CI or magnetic field is reversed, the plateaus disappear and the oscillation peaks assume their conventional shapes. In addition to the known frequencies of quantum oscillations of Bi, finding explanation in the one-particle picture, two new harmonics are observed since 2 - 2.5T (first frequency) and 10T (second frequency), respectively. Their periods of oscillation characterize larger than in single crystalline Bi cross-sectional areas of the FS and are related to the central and adjacent layers of interfaces. At least one of the harmonics in bicrystals with a higher superconducting transition temperature defines extremal cross-sectional areas of Fermi surface which is almost 70 times higher than that of FS of crystallites. We also emphasize that, in SDA bicrystals of an inclination type, the first harmonic became visible in magnetic fields (~ 2T) since the anomalies of LHQO can be identified. Another interesting feature of the development of Hall plateaus (including the one at 15T) is they vanish by magnetic field reverse, therby indicating that in SDA bicrystals the flow of Dirac fermions along the CI plane is sensitive to the field orientation and also that the localization process runs only in a specific direction of the magnetic field. These results indicate that in bicrystals there are spin-oriented carriers which are located in spectrum of Landau levels at particular orientation of the magnetic field.

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