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Experimental investigation of spin interference phenomena in InGaAs/InAlAs rectangular loop arrays SEBASTIEN FANIEL, TAKAAKI KOGA, GSIST and CRIS, Hokkaido University, Japan, YOSHIAKI SEKINE, NTT BRL, NTT Corporation, Japan — We report spin interference experiments in rectangular loop arrays built from InGaAs quantum wells. Low T magnetotransport measurements in such systems exhibit Alt'shuler-Aronov-Spivak (AAS) oscillations stemming from the interference between closed loop trajectories in clockwise and counterclockwise directions. In InGaAs devices, that show a large, gate-controllable spin-orbit (SO) interaction, this interference can be tuned by means of a front gate voltage, leading to a modulation of the AAS oscillations. The present work focuses on the anisotropic interplay between the Rashba and the Dresselhaus contributions to the SO interaction. Along the [-110] and the [110] crystallographic directions, the Rashba and the Dresselhaus effective magnetic fields are expected to be added or subtracted to/from each other. To probe this anisotropy, we study rectangular loop array interferometers whose sides are aligned along these two particular crystallographic directions. We analyze our results using a model that includes both the Dresselhaus and the Rashba SO interactions and accounts for phase decoherence in the devices. This work was supported by KAKENHI (19684009) and also partially by Support Center for Advanced Telecommunications Technology Research, Foundation (SCAT).

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