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Low-bias Transport Features in a Quantum Point Contact with a Variable Aspect Ratio[1] BRYAN HEMINGWAY, TAI-MIN LIU, ANDREI KOGAN, University of Cincinnati, STEVEN HERBERT, Xavier University, MICHAEL MELLOCH, Purdue University, UNIVERSITY OF CINCINNATI TEAM, XAVIER UNIVERSITY COLLABORATION, PURDUE UNIVERSITY COLLABORATION
— Quantum Point Contact (QPC) devices frequently display a zero- bias conductance anomaly (ZBA), the origin of which is not fully understood. To investigate a possible connection between the ZBA and the device geometry, we use a four-gate QPC device patterned on a GaAs/AlGaAs semiconductor heterostructure, aiming to achieve independent control over the transverse and the longitudinal potential profiles. In several regimes, we find a narrow ZBA that shows a pronounced temperature dependence for T<100 mK. Coulomb peaks arise under certain device settings, suggesting a weakly bound state located in the QPC. For other settings, we observe a plateau below the first conductance step. The plateau's conductance varies as the aspect ratio of the confining potential is changed. We describe a series of magnetic field measurements that show splitting of the ZBA and compare the findings to our measurements in a different, very short device which displayed no ZBA.

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