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Microscopic Origin of the 0.7-Anomaly in Quantum Point Contacts JAN HEYDER, FLORIAN BAUER, JAN VON DELFT, Ludwig Maximilians Universitaet Muenchen, ARNOLD SOMMERFELD CENTER TEAM — Quantum point contacts (QPCs) are short one-dimensional constrictions, usually patterned in a two-dimensional electron system, e.g. by applying voltages to local gates. The linear conductance of a point contact is quantized in units of $G_Q = 2e^2/h$. In addition, measured conductance curves exhibit an unexpected shoulder around $0.7G_Q$. In this regime quantities like electrical and thermal conductance, noise and thermo-power have anomalous behavior. These phenomena are collectively known as the "0.7-anomaly" in QPCs, and their origin is still subject to controversial discussions. We offer a detailed microscopic explanation for the 0.7-anomaly. Its origin is a smeared van Hove singularity in the local density of states at the bottom of the lowest one-dimensional subband of the point contact, which causes an anomalous enhancement in the Hartree potential barrier, magnetic spin susceptibility and inelastic scattering rate.

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