TITLE: Scanning Gate Imaging of the 0.7 Anomaly

BODY:

The study of low-dimensional ballistic systems has yielded a number of exciting observations and has made it possible to investigate several striking physical phenomena during the last 30 years. Despite the conceptual simplicity of the archetypical device, i.e. a quasi-1D constriction (or quantum point contact, QPC), these systems are still attracting much interest both from the point of view of fundamental electron-transport physics and for possible applications, for instance in spintronics. The origin of the anomalous transport feature appearing in QPCs at conductance G ~ 0.7x2e^2/h), the so-called 0.7 anomaly, represents a long standing puzzle. Several mechanisms were proposed to explain it, but a general consensus has not been achieved. A key open issue is whether point defects that can occur in these low-dimensional devices are the physical cause behind this conductance anomaly. Here we adopt a scanning gate microscopy technique to map individual impurity positions in several quasi-1D constrictions and correlate these with conductance characteristics. Our data demonstrate that the 0.7 anomaly can be observed irrespective of the presence of localized defects, and we conclude that the 0.7 anomaly is a fundamental property of low-dimensional systems.