Retracing Quantum Steps

Two authors of a feature article in *Europhysics News* would like the chance to supplement their list of references

After the publication of Quantum Conductance: a Step-by-Step Guide in the last issue of *EN*, it has been drawn to our attention that we neglected to mention two recent publications which also describe how electromagnetic relays can be used to produce quantised conductance steps. These are: H.Yasuda and A. Sakai *Phys. Rev. B* **56** (1997) 1069 and, especially, K. Hansen, E. Laegsgaard, I. Stensgaard and F. Besenbacher *Phys. Rev. B* **56** (1997) 2208 which includes many useful details of the experimental procedure. We wish to apologize to these authors for our omission.

Though our article was not intended to be a review, there are some other key references which deserve to be mentioned: C. J. Miller, J. M. van Ruitenbeck and L. J. de Jongh *Phys. Rev. Lett.* **69** (1992) 140 for the first clear observation of quantum steps in mechanically controllable break junctions; and M. Brandbyge *et al*, *Phys. Rev. B* **52** (1995) 8499 and J. M. Krans *et al*, *Nature* **375** (1995) 767 for the use of conductance histograms and detailed discussion of quantum conductance results.

It is also necessary to point out that the simple Landauer formalism may only be useful as a starting point for the understanding of conductance at point contacts. Even though it has been very successful in describing the conductance in metals like Na, in particular the disappearance of some conductance plateaus because of degenerate modes, its application to other metals is still controversial. For monovalent metals the first conductance plateau, which arises from a contact geometry of a single atom connecting the two electrodes, is usually understood to be quantum in nature. However, higher order peaks are more difficult to interpret since the processes taking place during the contact breaking are complex: tunnelling contributions are important and steps in conductance may arise from atomic rearrangements so that the conductance peaks are usually found over a large smooth background. The case of non-monovalent metals is even more complex, *see* E. Sheer *et al*, *Phys. Rev. Lett.* **78** (1997) 3535 and J.C. Cuevas *et al*, *Phys. Rev. Lett.* **80** (1998) 1066.

The 'quantisation of conductance' at point contacts has not been fully explored, is not yet fully understood, and is likely to remain a topic of further study and discussion for some time to come.

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