

Conductance quantization in the melt-spun cubic HoCu₅

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We present experimental results on the electrical conductance quantization in point contact between metallic (W) wire and binary compound HoCu₅ sample. A description of the quantization phenomena is presented in terms of the Landauer formalism for the current flowing through a small nanoconstruction. The conductance histogram were built up using consecutive conductance curves at room temperature. In all cases, the individual conductance traces clearly showed more or less pronounced conductance plateaus. We measured 3000 nanowires, formed between W and HoCu₅. In this case gently break a metallic contact, the corresponding conductance histogram, showed clear peak corresponding to the conductance step. For over 2500 conductance traces we found the conductance peak at $G = 0.95 G_0$ ($G_0 = 2e^2/h$) which corresponds to the conductance quantum associated with free propagation of the valence s electrons in the quantum channels. The quantum properties of conducting nanowires are dominantly determined by the nature of atomic structure, and we discuss the results in the context of related physical developments.

9.7 cm

13.4 cm

Subject category :

2. Quantum and Classical Spin Systems

Presentation mode :

poster

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