

February 17, 2022

To :

From : Physics article <https://physics.aps.org/articles/v15/s19>

original paper : <https://link.aps.org/doi/10.1103/PhysRevLett.128.076801>

Subject : Quantized Nonlinear Conductance in Ballistic Metals by C. Kane of PhysRevLett **128** 076801 (2022)

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C. Kane publishes the single-author PRL paper. His work shows that the nonlinear conductance of a two-dimensional electron gas should be quantized because of its Fermi surface topology.

What is done :

1. Thought experiment.

First, he visualized dividing the plane on which the leads sat into three regions, one for each lead. Then, he imagined applying separate voltage pulses to two regions with strengths such that they accelerated the Fermi surface electrons toward the third region. He then considered what happened to the number of electrons in that third region

2. Kane's thought experiment showed that the number of electrons in the third region was dependent on the Fermi surface topology of the system. He found the same result more rigorously via a quantum nonlinear response theory calculation.

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