

# Researchers develop one of the world's smallest electronic circuits

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The wires are separated by just 150 atoms. Credit: McGill University

A team of scientists, led by Guillaume Gervais from McGill's Physics Department and Mike Lilly from Sandia National Laboratories, has engineered one of the world's smallest electronic circuits. It is formed by two wires separated by only about 150 atoms or 15 nanometers (nm).

This discovery, published in the journal *Nature Nanotechnology*, could have a significant effect on the speed and power of the ever smaller [integrated circuits](#) of the future in everything from smartphones to desktop computers, televisions and [GPS systems](#).

This is the first time that anyone has studied how the wires in an electronic circuit interact with one another when packed so tightly together. Surprisingly, the authors found that the effect of one wire on

the other can be either positive or negative. This means that a current in one wire can produce a current in the other one that is either in the same or the opposite direction. This discovery, based on the principles of [quantum physics](#), suggests a need to revise our understanding of how even the simplest electronic circuits behave at the nanoscale.

In addition to the effect on the speed and efficiency of future [electronic circuits](#), this discovery could also help to solve one of the major challenges facing future computer design. This is managing the ever-increasing amount of heat produced by integrated circuits. Well-known theorist Markus Büttiker speculates that it may be possible to harness the energy lost as heat in one wire by using other wires nearby. Moreover, Büttiker believes that these findings will have an impact on the future of both fundamental and applied research in nanoelectronics.

**More information:** *Nature Nanotechnology*,  
[www.nature.com/nnano/journal/v ... /nnano.2011.182.html](http://www.nature.com/nnano/journal/v.../nnano.2011.182.html)

Provided by McGill University

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