

# The Smallest Solenoid

May 30 2005

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Nanoscopic wires grown in gold may be the world's smallest solenoids, according to new theoretical analysis of the structures. Solenoids are typically tubes made of coiled wire. They conduct electricity along the spiraled wires to generate magnetic fields that run the length of their interiors. Solenoids are often important components of circuits and switches in their macroscopic form.

The nanoscopic versions, known as Helical Gold Nanowires (HGN), consist of concentric layers of gold atoms. In the simplest incarnation, a wire only one atom thick is surrounded by a tube of atoms.

The analysis of the HGNS shows that electrical current may spiral around the wires as it travels along the wire length. Considering the size of the wires (0.6 nanometers, or a hundred million times thinner than a human hair), it is likely to be difficult to measure the magnetic fields they produce.

Nevertheless, if confirmed experimentally, the solenoids add yet another tiny component to the list of nanoscopic electronic parts (resistors, transistors, capacitors) needed to construct highly miniaturized circuits and machines.

**Publication:**

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Phys. Rev. Lett. 94, 206806 (2005), 27 May 2005

[link.aps.org/abstract/PRL/v94/e206806](http://link.aps.org/abstract/PRL/v94/e206806)

Source: American Physical Society

Citation: The Smallest Solenoid (2005, May 30) retrieved 26 April 2024 from <https://phys.org/news/2005-05-smallest-solenoid.html>

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