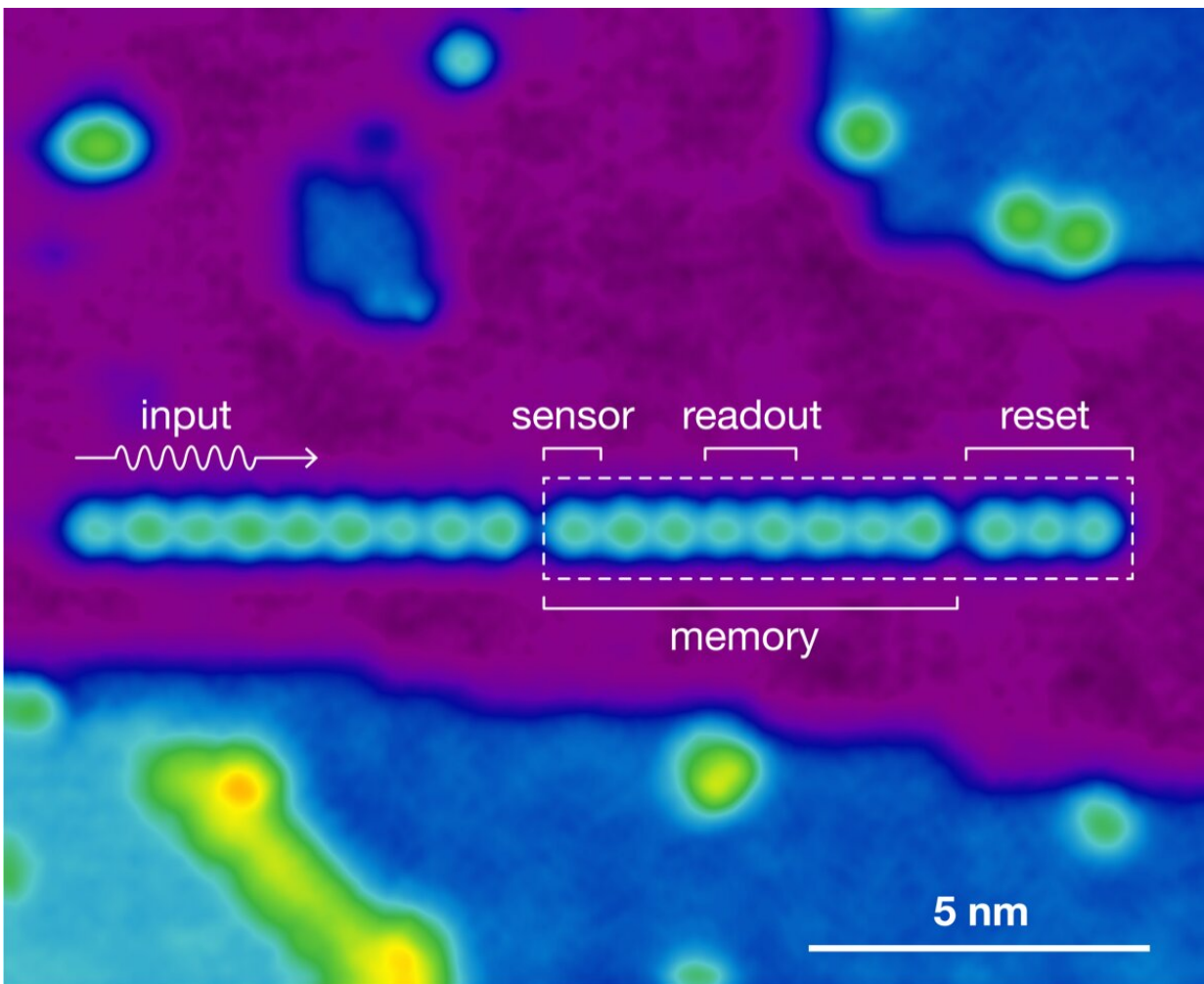


Researchers build sensor consisting of only 11 atoms

May 26 2020



Credit: TU Delft/Sander Otte Lab

Researchers at Delft University of Technology have developed a sensor that is only 11 atoms in size. The sensor is capable of capturing magnetic waves and consists of an antenna, a readout capability, a reset button and a memory unit. The researchers hope to use their atomic sensor to learn more about the behaviour of magnetic waves, so that hopefully such waves can one day be used in green ICT applications.

In theory, engineers can make electronic data processing much more efficient by switching to spintronics. Instead of using [electrical signals](#), this technology makes use of magnetic signals to transmit data. Unfortunately, magnetism tends to get incredibly complicated, especially at the tiny scale of computer chips. A [magnetic wave](#) can be viewed as millions of compass needles performing a complex collective dance. Not only do the waves propagate extremely quickly, causing them to vanish in mere nanoseconds, the tricky laws of quantum mechanics also allow them to travel in multiple directions at the same time. This makes them even more elusive.

Mouse trap for magnetic waves

In order to study these rapid oscillations, researchers from Delft University of Technology have developed a minuscule device consisting of only 11 atoms. It is equipped with an antenna, a readout capability, a reset button and a memory unit to store the measurement outcomes. The central idea of the invention is that the device instantly detects a passing magnetic wave and remembers this information. "Compare it to a mouse trap," research leader Sander Otte explains. "A mouse is typically too fast and too small to capture by hand. But a mouse trap reacts very quickly and then hold the [mouse](#) in place."

The researchers connected the device to magnetic atomic wires through which magnetic waves were transmitting. Although the test wires were very short, the results are promising: The waves moved very peculiarly,

as one would expect from quantum mechanics. The next step is to apply this technique to more complicated circuits in order to gain more insight into the behaviour of spintronics.

More information: "Remote detection and recording of atomic-scale spin dynamics", R.J.G. Elbertse, D. Coffey, J. Gobeil, A.F. Otte, *Communications Physics*, [DOI: 10.5281/zenodo.3759448](https://doi.org/10.5281/zenodo.3759448)

Provided by Delft University of Technology

Citation: Researchers build sensor consisting of only 11 atoms (2020, May 26) retrieved 4 May 2024 from <https://phys.org/news/2020-05-sensor-atoms.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.