

Beating the back-up blues

April 3 2009

That sinking feeling when your hard disk starts screeching and you haven't backed up your holiday photos is a step closer to becoming a thing of the past thanks to research into a new kind of computer memory.

Physicists at the University of Leeds and scientists at IBM Research's Zurich lab have made new advances in researching a new kind of memory, called 'racetrack' memory, which could become the standard method of storing information on home computers.

Your hard drive is a metal disc made up of millions of tiny spaces, called domains, in which all the atoms are magnetised in one direction or the other to represent binary data. Much like a record player, the disc spins around until the 'head' finds and reads the information.

Racetrack memory, a concept invented by Stuart Parkin at IBM Research's Almaden Lab, has no moving parts - instead it is the information which moves. Using a kind of physics called spin transfer, scientists use electrons (in the form of electrical current) to switch the magnetism of the domains, pushing them to a different location along a nanowire.

Recently published in [Physical Review Letters](#), the new research holds up a magnifying glass to how tiny magnetic devices behave. Using a special electron microscope that can 'see' magnetism, scientists imaged a wall between two domains that lies in a notch in the side of the wire. This site, called a pinning centre, is where information starts and stops

on its journey along the wire.

The researchers were then able to measure the current that was needed to blow the wall out of differently shaped notches.

The aim is to be able to reduce the current, and hence power, needed to move the information along the wire.

"The reason why the [hard disk](#) on your computer is likely to break is because it has moving parts which eventually wear out, but the racetrack method of storing information is much more reliable as all the parts are static," says Dr Chris Marrows, reader in condensed matter physics at the University of Leeds.

Compared with flash memory - the kind of solid state memory you find in flash drives and iPods - racetrack memory's huge advantage is on price. It is estimated that a racetrack memory in a computer would be 100 times cheaper per bit than flash.

"Magnetic racetrack memory is designed to replace the hard disk, and it's estimated that it could compete on price since it's very dense - it can store lots of bits of data on a small area of chip, as the information is stored in vertical towers," says Dr Marrows.

As well as being more reliable than hard disks, racetrack memory is also faster. There are no 'seek' times when the head has to search the disk for information, so computers would be able to boot up almost instantly.

The next stage for the team is to develop better materials from which to make the racetrack components. A fully working race track memory is anticipated to be available within 10 years.

[More information:](#) This research has been published in the April issue of

Physical Review Letters.

Source: University of Leeds ([news](#) : [web](#))

Citation: Beating the back-up blues (2009, April 3) retrieved 3 May 2024 from
<https://phys.org/news/2009-04-back-up-blues.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.