Research Highlights

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Magnetism: Spins on the move

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As the basic unit of storage in magnetic recording media gets smaller, many techniques for measuring the magnetic properties of systems reach the limit of their sensitivity. However, Jack Sankey and co-workers at Cornell University in the US have shown how one approach – ferromagnetic resonance (FMR) – can be adapted to work on sub-100-nm-scale devices.

Sankey and co-workers are interested in magnetic nanopillars that consist of two ultrathin ferromagnetic layers separated by a non-magnetic spacer. The resistance of such a structure depends on the relative orientation of the magnetization in the magnetic layers – a phenomenon known as magnetoresistance – and the device resistance will oscillate in time if the magnetization in either layer is made to precess.

In conventional FMR, an oscillating magnetic field causes the electron spins to precess and the resulting magnetic motion is detected with a radio frequency (RF) coil. However, the Cornell team exploits the magnetization carried by a spin-polarized alternating current passed through the device. By using this current to both excite the precession in the first place, and also measure the properties of the resonance, this new approach is capable of much greater sensitivity than the standard approach.

The new approach works for sample volumes 50 times smaller than those previously measured with FMR, and could be useful in experiments on molecular magnets. It also allows the damping coefficient for spin-polarization, an important parameter in spin-based memory devices, to be measured directly.

REFERENCES

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