

QUANTUM COMPUTING

Noisy quantum calculations

Researchers have proposed a way to make use of noise in quantum computing.

Isolating systems from 'noisy' environmental interactions has been the focus of much research. Jens Eisert and his colleagues at the Free University of Berlin, however, propose an alternate framework in which information is encoded in a quantum system combined with its noisy environment.

To do this, the authors exploit an effect called the cutoff phenomenon, in which combined systems suddenly change states. This phenomenon defines points in time to launch calculations or read out results.

Phys. Rev. Lett. 110, 110501 (2013)

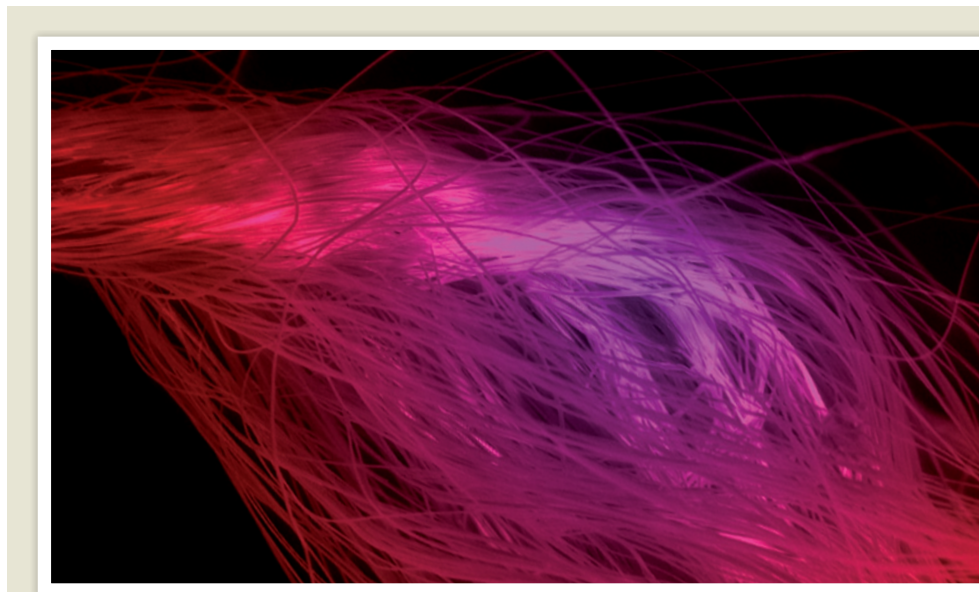
MEDICINE

Blood test for cancer DNA

The DNA that is shed into the bloodstream from dying cancer cells might one day be used to monitor the disease.

Carlos Caldas at the Cancer Research UK Cambridge Institute and his colleagues identified genetic markers to track disease in 30 women being treated for advanced breast cancer. They found that a technique to detect these markers in cancer-cell DNA in the blood was more sensitive than tests that look for circulating tumour cells or for a cancer antigen. The amount of tumour DNA also roughly correlated with the response to treatment.

The authors suggest that blood tests based on tumour DNA could be quicker and less-invasive than biopsies.



NANOMATERIALS

Fibres toughen when stretched

When most tough fibres are stretched to make them thinner, they become brittle. But a group led by Yuris Dzenis at the University of Nebraska–Lincoln has shown that this is not always the case.

The researchers made polyacrylonitrile fibres (pictured) using a technique called electrospinning. As their diameters narrowed to below 250 nanometres, the fibres became tougher and so were less prone to fracture, but

did not lose their strength. Nanofibres were up to 10-fold tougher and stronger than the best commercial fibres.

Dzenis suggests that the toughening is possible because the nanofibres are less crystalline than larger fibres. He thinks that the fibres could be used in load-bearing aerospace structures and bulletproof materials.

ACS Nano <http://dx.doi.org/10.1021/nn400028p> (2013)

N. Engl. J. Med. <http://dx.doi.org/10.1056/NEJMoa1213261> (2013)

For a longer story on this research, see go.nature.com/luwx3m

IMMUNOLOGY

Flu vaccines may improve with age

A subset of white blood cells may determine who is best protected by seasonal flu vaccines.

Hideki Ueno at Baylor Research Institute in Dallas, Texas, and Octavio Ramilo at the Nationwide Children's Hospital in Columbus,

Ohio, and their colleagues injected 49 adults and 19 children with flu vaccine. The researchers tracked cell types in individuals over time and discovered a particular class of immune cells that is activated on vaccination. These cells can boost production of existing antibodies that fight flu, but they do not induce production of new antibodies. This suggests that the current flu-vaccine strategy may be less effective in young children and against rare types of flu, such as H5N1. *Sci. Transl. Med.* 5, 176ra32 (2013)

MICROBIOLOGY

Life on the seabed, and below

The dark abyss of the Mariana Trench in the western Pacific Ocean hosts a surprisingly active bacterial community.

By using an automated deep-sea instrument that they designed, a team led by Ronnie Glud at the University of Southern Denmark in Odense measured rates of biological oxygen consumption in the almost 11-kilometre-deep ocean trench. The high rates they found there suggest that degradable organic matter