

Magnetic moment

Using data on solar magnetism from the ESA-NASA spacecraft *Ulysses*, scientists at Rutherford Appleton Laboratory have calculated that the Sun's coronal magnetic field has doubled in the past 100 years, which could have a bearing on observed climate change on Earth.

Ulysses found that the coronal magnetic field is actually unexpectedly uniform. Then the RAL team was able to use data measured at a single point in space (the Earth) to deduce the recent history of the magnetic field for the Sun.

Records of magnetic storms on Earth date back to 1868 and show cycles of intensity matching those of sunspot activity. The rate of magnetic storms has also been steadily increasing though the 20th century – pointing to an increasing solar magnetic field.

Since the solar wind is linked to the Sun's magnetic field and itself affects the amount of cosmic radiation hitting the Earth's atmosphere and seeding cloud cover, an increasing solar magnetic field may have an impact on the Earth's average temperature (which has risen by 0.6° in the last 100 years).

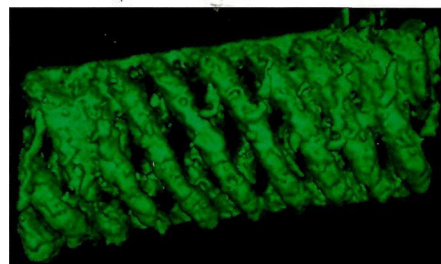
However, other scientists believe that man-made "greenhouse" effects due to aerosols and the burning of fossil fuels and forests must still not be ignored.

Imaging in perfect harmony

Imaging biological samples has often been hard to do with sufficient clarity. Now scientists at UC San Diego have exploited a new technique to produce a clear three-dimensional image of a living system.

A tightly-focused laser trained on a sample can generate light waves in the material at frequencies that are multiples of the original frequency – the second harmonic, third harmonic, and so on. By detecting, for example, just the third harmonic radiation and scanning the laser across the sample, a series of images can be built up (each within 2 s) to form an image with a spatial resolution equal to the focal size of the laser.

AIP



This three-dimensional picture of an algae specimen (about $100 \times 50 \mu\text{m}$) is formed from a series of cross-sectional images produced by scanning the sample with a laser pulse and detecting the third harmonic radiation generated.

Computing takes a quantum leap

Scientists from MIT, Los Alamos and Harvard have produced the first simulation of quantum mechanical processes using a quantum computer, which, as Richard Feynman suggested, such computers are ideally suited to.

The researchers chose a familiar undergraduate physics problem – a "truncated harmonic oscillator", in this case the series of energy levels available to a quantum particle bound

to another object (e.g. an electron bound to a proton), with a finite number of energy levels.

The computer is liquid 2,3-dibromothiophene, programmed by NMR techniques: an external magnetic field forces the nuclei in the liquid to align with their spin either "up" or "down" – matching the "1" and "0" of binary code. Manipulating the spins of two nuclei within each molecule reveals the possible energy states for this two-spin system and exactly simulates the possible energy states for the quantum particle. The next challenge is the extension of the simulation to the real-life model of a hydrogen atom.

AIP

Clean quackers

Researchers in Melbourne have found a novel and effective way to clean birds caught in oil spills. Oil-soaked duck feathers were coated with iron powder and then combed with a

magnet, drawing out the iron powder and 97% of the oil contaminants. Moreover, the feathers retained their structure and waterproof quality – unlike after cleaning with detergents. The process is also quick and less stressful for the birds. A portable field unit is currently being developed.

New Scientist



Turn down the noise

Turning up the volume of a weak radio signal amid noise increases both the signal and the noise. Sometimes actively increasing the noise can enhance the signal-to-noise ratio, in a process known as stochastic resonance.

Scientists from Italy, Germany and the US have demonstrated how to control stochastic resonance by varying the phase of an external modulation applied to a stochastic resonator. Results show that the output signal can be enhanced or suppressed and can be applied in communications, for vibration control in mechanical devices and also in biology – to understand how sensory systems can pick out faint signals and perhaps to suppress unwanted interactions between electromagnetic radiation and biological tissue.

AIP



UNUSUAL

REQUESTS

Goodfellow is an established specialist supplier of small quantities of metals & materials for research, development, prototyping and design.

Our product range is renowned for being the most comprehensive of any source in the world.

Whilst we can't guarantee to make fairy tales come true, we can help with your unusual requests for materials. Contact us now for a copy of our new product guide and find out what we can do for you.

Goodfellow

Goodfellow Cambridge Limited
Cambridge Science Park, Cambridge, CB4 4 DJ
Freephone: 0800 7314653 Telephone: 01223 568 068
Facsimile: 01223 420 639
Email: info@goodfellow.com
Web: www.goodfellow.com

UNE HAUTE IDÉE DE L'ENTREPRISE

À 10 minutes de l'aéroport international de Genève, au carrefour des réseaux autoroutiers F / CH / D / I, près de deux gares TGV, à proximité du prestigieux CERN.

propose sur 40 hectares :
des parcelles de terrains viabilisées (achat ou location)
des bureaux et des bâtiments mixtes
une pépinière d'entreprises
des services spécifiques d'assistance aux entreprises pour une implantation régionale et pour des relations avec le CERN
un Bureau de Rapprochement des Entreprises agréé par l'UE.

LE
TECHNOPARC
- PAYS DE GEX -

A Ten minutes' drive to Geneva International Airport, at the crossroads of the F/CH/D/I motorways, close to two TGV railway stations, right next to the prestigious CERN.

proposes 100 acres (40 ha) of equipped site with :
pieces of land (purchasing or renting)
offices spaces
activity buildings
incubator
Business Corporation Center agreed by EU.

CONTACT :
**COMMUNAUTÉ DE COMMUNES
DU PAYS DE GEX**

Technoparc - Pays de Gex -
F-01630 Saint-Genis-Pouilly
Tél. 04 50 42 65 00 - Fax 04 50 42 65 01
E-mail : bregex@leman.com
internet : <http://www.leman.com/~bregex>

