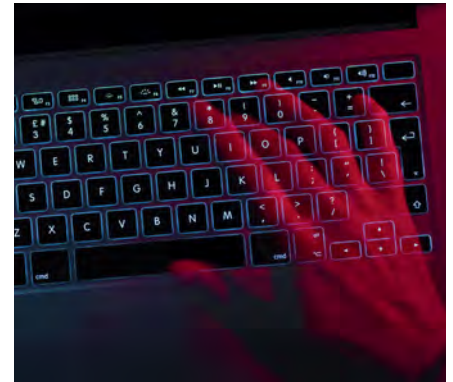




Contents



18 BIG DATA

18 Gravitational Waves on Home Computers

The Einstein@Home project makes it possible for anyone to search for gravitational waves on their own PC, laptop or smartphone and thus become scientific explorers themselves. The software also detects pulsars. Researchers from the Max Planck Institute for Gravitational Physics are significantly involved in this citizen science project. Researchers from the Max Planck Institute for Radio Astronomy are also trawling through the data.

26 Stacking Data

For historians, big data is not an entirely new phenomenon. Even in the 18th and 19th centuries, scholars, scientists and state authorities collected huge quantities of data, and analyzing all this raw material posed a challenge back then just as it does today. A group at the Max Planck Institute for the History of Science looks at the methods used in the past – many of them unexpected – and examines how changes in data processing has ultimately brought about changes in science and society.

34 Treasure Hunt in the Data Jungle

Researchers normally formulate a hypothesis before beginning an experiment and collecting data. Scientists at the Max Planck Institute for Informatics are turning this scientific principle on its head. Their software can analyze existing datasets and retrospectively extract hypotheses and unexpected correlations. These, in turn, give scientists important clues for asking new questions.

ON THE COVER We live in the Information Age. The amount of data flowing through networks is increasing exponentially. Structuring and using this big data, as experts refer to it, in a meaningful way is becoming more and more challenging. New technologies are needed to manage the torrent.

10 On the net: Hackers attempt to influence elections in democratic countries.

PERSPECTIVES

- 06 Coping with the Past to Celebrate Its Anniversary
- 06 Support for Open Access
- 07 "Establishing the principle of excellence was a milestone"
- 08 New Ties to the Netherlands and China
- 08 Technology Transfer across the Atlantic
- 09 The Dilemma of Animal Research
- 09 On the Net

VIEWPOINT

- 10 **Cyber Attacks on Free Elections**
Wouldn't it be much easier and more convenient to vote from our home computers or smartphones? It's better that we don't, as even without online elections, there are many possibilities for manipulation.

FOCUS

- 18 Gravitational Waves on Home Computers
- 26 Stacking Data
- 34 Treasure Hunt in the Data Jungle



54 In the magnetic field: The MRI delivers live images of the tongue movements of a horn player.



62 In the ring: Researchers use this circular track to observe the swarm behavior of locusts.



70 Under the spell: Scientists have measured the effect of art on body and mind for the first time.

SPECTRUM

- 40** Radio Burst from a Dwarf Galaxy
- 40** Virtual Liver Could Reduce Need for Animal Research
- 41** Speed Dating among Birds
- 41** Early Forestry in the Amazon
- 42** A 50,000-Year Connection to Country
- 42** Green Chemistry from the Mussel Foot
- 43** Holograms for Biomedicine
- 43** New Biomarkers for Bowel Cancer Treatment
- 43** Steel with a Bone Structure
- 44** Most People Don't Want to Know Their Future
- 44** Dark Matter Not Found
- 45** A Connection to Others' Thoughts
- 45** Growth despite Fasting
- 45** Older but Bolder

BIOLOGY & MEDICINE

- 46** **Exploring the Microbial Cosmos**
Personal Portrait: Ruth Ley

MATERIALS & TECHNOLOGY

- 54** **Live View of the Focus of Disease**
Doctors and patients can thank magnetic resonance imaging – and not least a Max Planck researcher – for the fact that many diseases can now be diagnosed far more effectively than they could 30 years ago. That researcher now wants to bring those images to life.

ENVIRONMENT & CLIMATE

- 62** **Why Animals Swarm for Swarms**
These days, everyone is talking about swarm intelligence. But are swarms really smarter than individuals? And what rules, if any, do they follow? Scientists are using new computational techniques to impose order on the seeming chaos of swarms.

CULTURE & SOCIETY

- 70** **The Power of Art**
How do people react, mentally and physically, to poetry and prose? Researchers have actually succeeded in rendering the effect of poetic and rhetorical language measurable – even in such intangible categories as elegance, or with such curious phenomena as the trash film cult.

REGULAR FEATURES

- 03** **On Location**
- 16** **Post to – California, USA**
I'm trying to find a good balance
- 78** **Flashback**
A Quantum of Energy
- 80** **Max Planck Community**
80 Making It Easier to Plan a Career
81 OpenCon 2017 in Berlin
Award-Winning Research Video
82 Shaw Prize for Simon D.M. White
- 83** **Research Establishments**
- 83** **Publisher's Information**