

# Contents



**48** In use: Emmanuelle Charpentier developed a revolutionary method: CRISPR-Cas9.

## 18 ROBOTICS

### 18 Robots Go to School

As domestic help, healthcare assistants or emergency response units: robots are suitable for these jobs only if they are capable of learning and acting independently. Stefan Schaal and his team at the Max Planck Institute for Intelligent Systems in Tübingen are teaching machines to become flexible and autonomous.

### 26 Diagnostics with a Stomach Pill

Gastroscopy is an unpleasant procedure. Capsules containing cameras can change that if they can be controlled from outside. Metin Sitti and his team of researchers at the Max Planck Institute for Intelligent Systems in Stuttgart are working on this.

### 34 Cars Open Their Eyes

A time may yet come when everyone has their own chauffeur – if robots take the wheel. For this to happen, computers will have to be able to assess traffic situations at least as well as drivers do. Andreas Geiger and his team at the Max Planck Institute for Intelligent Systems in Tübingen are working to develop the necessary software.

**ON THE COVER** Robots are the heroes of the future. Soon we expect to see them driving cars, helping people in need of care, saving lives in disaster situations, or working as tiny helpers in the body to perform medical tasks. But science still has many hurdles to clear before all this can happen.

## PERSPECTIVES

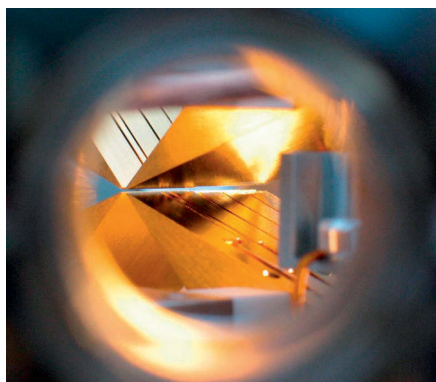
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- 10** **How Terrorists Are Made**  
Terrorist attacks like those in Paris leave us bewildered. We're unable – and usually unwilling – to understand why people kill others indiscriminately. However, we should try to understand terrorists in order to combat the causes of violence.

## FOCUS

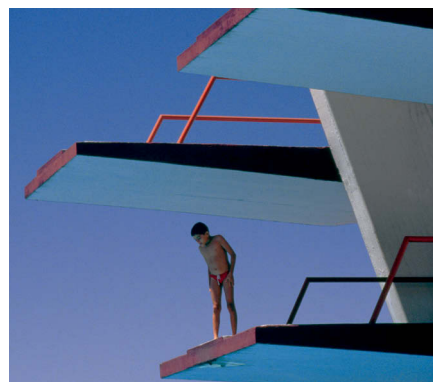
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**54** In a Paul trap: Charged particles can be stored there and used for quantum computers.



**62** In a petri dish: The lab is a good place to observe bacteria communities and how they cooperate.



**70** In a quandary: Researchers, too, want to know if people dare to jump from the five-meter board.

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- 48** **An Artist in Gene Editing**  
Personal Portrait:  
Emmanuelle Charpentier

## PHYSICS & ASTRONOMY

- 54** **Counting on Quanta**  
Quantum computers are expected to be able to trawl through huge quantities of data at lightning speed, but it will still be some time before they are realized. This research, however, is already opening up new paths – for instance for quantum simulators for developing new materials.

## ENVIRONMENT & CLIMATE

- 62** **Bacteria Need Partners**  
Bacteria live in teams: they can't help but cooperate. To find out how they work together, scientists have to use cleverly devised experiments.

## CULTURE & SOCIETY

- 70** **Bedtime Stories or Bali?**  
We constantly have to make decisions, often in complex situations, under time pressure and without all the necessary information. Researchers are studying which strategies we use and how successful they are.

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