

Sciencewatch

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Incandescent return

A new approach to incandescent bulbs promises to beat LEDs for efficiency. Ognjen Ilic and colleagues at MIT replaced the traditional light-bulb filament with a flat tungsten ribbon. They then coated glass sheets with a photonic crystal made of alternating layers of tantalum oxide and silicon dioxide, with thicknesses determined by computer modelling, and

sandwiched the tungsten between the two.

The photonic crystals are transparent to visible light but reflect infrared photons back onto the filament so that they reheat it instead of being radiated. The efficiency so far is 6.6%, triple that of conventional light bulbs, but 40% may be reachable, which would far outstrip compact fluorescent bulbs (7% to 13%) and LED's (5% to 15%).

Chuck Coker (CC)



New incandescent bulbs using a flat tungsten ribbon promise to beat LEDs for efficiency.

● Further reading

O Ilic *et al.* 2016 *Nature Nanotechnology* doi:10.1038/nnano.2015.309.

The brightest supernova

A new supernova is more than twice as luminous as any seen before, at its peak being brighter than 570 billion suns. Subo Dong of Peking University in Beijing, China, and colleagues found the supernova – dubbed ASASSN-15lh – at a redshift of 0.2326, apparently in a luminous galaxy with little star formation. The power it has radiated in the first four months post-detection strains conventional models for its power source, so in addition to breaking a record, it poses an astrophysical puzzle.

● Further reading

S Dong *et al.* 2016 *Science* **351** 257.

Google plays Go

A computer has finally beaten a human at the ancient board game Go – and rather dramatically. Developed by Google DeepMind in London, the program AlphaGo uses deep neural networks to get around the traditional problems of a simple search due to the size of the search space. The network training was from games with human experts and from random games of self-play, so in a sense there was a bit of human in the software, which some might find consoling because the score wasn't close: AlphaGo 5, European Go champion 0. Expectations had been that this would not happen for at least another decade.

● Further reading

D Silver *et al.* 2016 *Nature* **529** 484.

Babylonians tracked Jupiter

The idea of obtaining distance by integrating speed with respect to time is an elementary one today for anyone who has studied

When trees break

Data suggest that trees break at a critical wind speed of about 42 m/s, regardless of the characteristics of any given tree. This has now been explained by Christophe Clanet of LadHyX, of the Ecole Polytechnique in Palaiseau, France, and colleagues, using Hooke's law, the Griffiths criterion for cracks, and tree allometry and modelling trees as fragile rods. The maximum wind speeds on Earth are about 50 m/s, so this may be part of why trees are so long-lived.

● Further reading

E Viot *et al.* 2016 *Phys. Rev. E* **93** 023001.

high-school calculus, but it now appears that the idea was used by astronomers in ancient Babylon to calculate the position of Jupiter. Mathieu Ossendrijver of Humboldt University in Berlin, Germany, studied four cuneiform tablets, part of a collection of some 450 from between 400 and 50 BC. It's not full calculus, but it is the trapezoidal rule, far earlier than anyone thought possible. Jupiter held special significance to the Babylonians because it represented Marduk, their patron god.

● Further reading

M Ossendrijver 2016 *Science* **351** 482.

Back to nine planets?

If you are unhappy about Pluto losing its official status as a planet, the good news is that there may be a 9th one that we've missed so far, orbiting out beyond Pluto with a period of 10,000–20,000 years. While not yet seen directly, Konstantin Batygin and Michael E Brown of Caltech argue that just such a planet, with a mass of around 10 Earth

masses or more, explains an otherwise mysterious clustering seen in Kuiper-belt objects. It spends much of the time very far from the Sun, so would be hard to see directly, but the Subaru Telescope in Hawaii has a chance, as does the Large Synoptic Survey Telescope in Chile, which should start operating within 10 years.

● Further reading

K Batygin and M E Brown 2016 *The Astronomical Journal* **151** 22.

A plant that counts

Remarkably, the Venus flytrap can count to five. Erwin Neher of the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany, and colleagues, recorded electrical impulses from the plant in response to one to 60 touches. Two touches close the trap, but after only five touches the plant starts to make the enzyme that digests its prey, and to increase production of a sodium transporter used to absorb nutrients.

● Further reading

J Böhm *et al.* 2016 *Current Biology* **26** 286.

First castes

Social insects have castes – queens, workers, and soldiers – and the origin of this structure has been tracked back to ancient termites. Michael Engel of the University of Kansas in Lawrence and colleagues found six termite species preserved in amber from Myanmar, showing evidence of castes and dating back 100 million years. The previous oldest caste soldiers were just 17 million years old.

● Further reading

M S Engel *et al.* 2016 *Current Biology* doi:10.1016/j.cub.2015.12.061.

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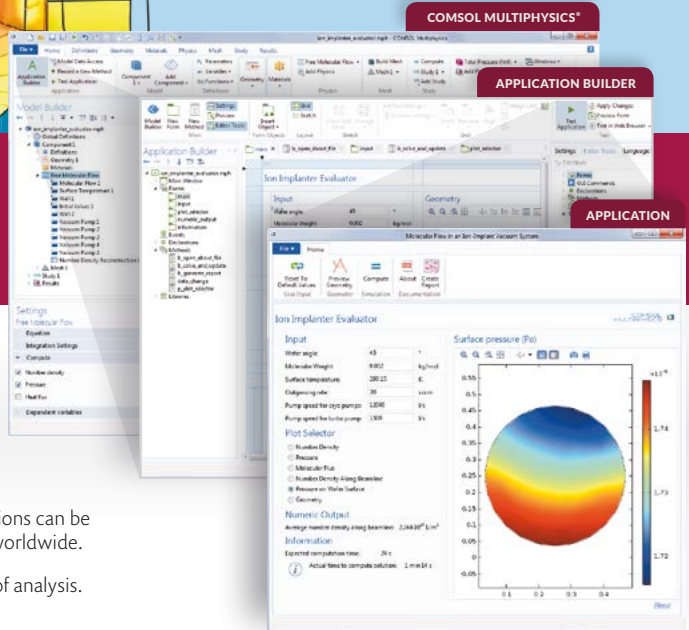
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