

Sciencewatch

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Plants that drink from rocks

Some plants are able to live in dry environments by extracting water from the crystalline structure of gypsum, in the absence of any free liquid water. Sara Palacio of the Instituto Pirenaico de Ecología in Jaca, Spain, and colleagues have shown that the gypsum specialist plant *Helianthemum squamatum* – a small evergreen shrub that can be found in northeastern Spain, and other places – can draw water from gypsum. The mineral, which is a hydrated form of calcium sulphate

($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), can also exist as bassanite with a quarter of the water content, or as anhydrite, with no water at all. The isotopic composition of the crystallization water in gypsum differs from free water, and can be used to show that for shallow-rooted plants, 70–90% of the water taken up comes from gypsum. Details of how the plants extract the crystallization water have yet to be worked out, but it is interesting to note that gypsum is widespread not just on Earth, but also on Mars.



Helianthemum squamatum. (Image credit: Ghislain118 <http://www.fleurs-des-montagnes.net>.)

● Further reading

S Palacio *et al.* 2014 *Nature Commun.* **5** 4660.

Imaging with undetected photons

In a remarkable extension of earlier interaction-free measurement techniques, Gabriela Barreto Lemos of the Austrian Academy of Sciences in Vienna and colleagues have managed to make images using only photons that have not interacted with the object to be visualized. Two separate down-conversion nonlinear crystals are driven with the same pump laser, but creating only one pair of photons. The ambiguity in which crystal produced the photons, together with a rather subtle interferometric set-up, allows an image to be formed entirely using information from photons that are not themselves detected – that is, the photons that illuminate the object are not detected, while those that are detected never illuminated the object. The technique is demonstrated by making images of objects that are opaque or invisible to the photons that are detected.

● Further reading

G B Lemos *et al.* 2014 *Nature* **512** 409.

Reliable teleportation

Implicit in the now iconic phrase “Beam me up, Scotty!” is the assumption that teleportation should be reliable – something that has only just been achieved. W Pfaff of Delft University in the Netherlands and colleagues used two diamond crystals, each with a cryogenically cooled nitrogen-vacancy (NV) as the sender and receiver sites (traditionally called “Alice” and “Bob”). An input qubit is entangled with Alice’s NV, 3 m from Bob’s, with which it was previously entangled by optical means. Before decoherence spoils things – here a few milliseconds – Alice couples her input

Space dust

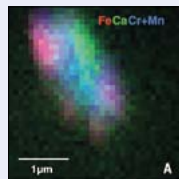
NASA’s Stardust spacecraft might have brought the first specks of dust from outside the Solar System back to Earth. Andrew Westphal of the University of California, Berkeley, and colleagues, together with 30,714 volunteers worldwide working with Stardust@home, scanned more than 1 million tracks left in the .1 m² Stardust Interstellar

Dust Collector. The collector, made of ultralow-density aerogel and aluminium, was exposed to the interstellar dust stream coming from the direction of the constellation Ophiuchus for 195 days during two periods in 2000 and 2002.

Interstellar dust-particle candidates were distinguished on the basis of composition and/or impact trajectory, rather than in a particle-physics experiment. Seven candidate dust specks were found – one dominated by carbon, another a silicate, and the others more complex. The observations diverge from any one representative model of interstellar dust, leaving the understanding of its nature an ongoing open problem that will take more data to solve.

● Further reading

A J Westphal *et al.* 2014 *Science* **345** 786.



Tri-colour iron, calcium, (chromium+ manganese) elemental map of one dust-particle candidate derived from X-ray fluorescence data.

qubit to her NV, and makes a measurement whose result can then inform Bob (via a classical channel) what to do to his NV to get the original qubit at his end.

This is a first for quantum teleportation between distant solid-state (as opposed to photonics) qubits. Owing to small imperfections, the actual fidelity was 86%, but in principle could be perfect. Now it is just a matter of getting from one qubit up to Avogadro’s number, to make Star Trek fans happy, but in the meantime the technique holds great promise for quantum computing.

● Further reading

W Pfaff *et al.* 2014 *Science* **345** 532.

Searching for (not-so?) intelligent alien life

Attempts to detect signatures of alien life have involved looking for atmospheres with molecular oxygen and a reducing gas, but what about intelligent life? Henry Lin of Harvard College in Cambridge, Massachusetts, and colleagues have made the amusing – or perhaps depressing – suggestion that exoplanetary atmospheres could be searched for industrial pollutants, such as the chlorinated fluorocarbons (CFCs) that are damaging our own ozone layer and are unlikely to arise naturally. They estimate that the James Webb Space Telescope could, within a couple of days of observation and at no significant extra cost, check out other worlds, not just for signs of life, but for signs that their residents are dumping around 10 times as much CFCs into their atmospheres as we have done.

● Further reading

H W Lin *et al.* 2014 *The Astrophysical Journal Letters* **792** L7.

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