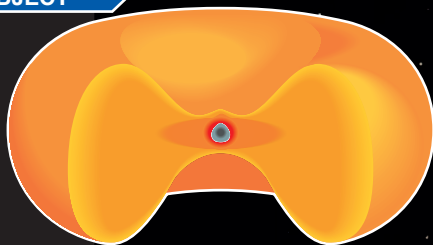


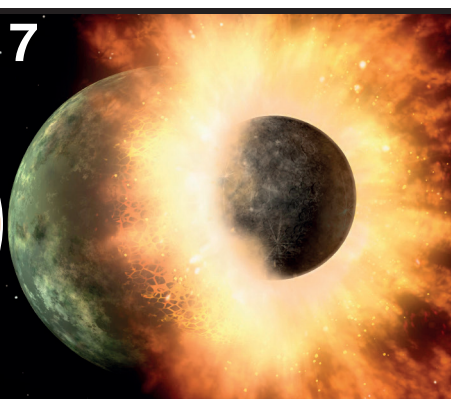
# Scientific achievements of 2017

## NEW TYPE OF PLANETARY OBJECT

Planetary scientists from Harvard and the University of California propose a new type of cosmic object called a **synestia** – a massive, spinning, doughnut-shaped cloud of superheated rock and molten space debris, formed as planet-sized objects smash into each other



Earth probably became a synestia for a brief period about 4.5 billion years ago



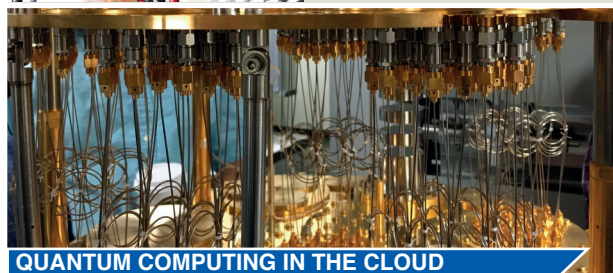
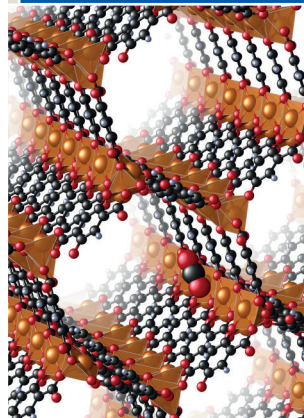
## HARVESTING CLEAN WATER FROM AIR

Collaborators at MIT and University of California, Berkeley, create a prototype that pulls water from dry air. The device uses **MOF-801\*** – **zirconium fumarate** – a porous hygroscopic crystal with an ultrahigh surface area†.

MOF-801 pulls moisture into its pores and feeds water into a collector, powered only by sunlight

\*Metal-organic frameworks

†Surface area of more than 7,000 square metres/gram



## QUANTUM COMPUTING IN THE CLOUD

IBM Research makes quantum computing available to the public, providing access to a **20-qubit quantum computer** from any desktop or mobile device via the cloud. Classical computer memory uses list of bits‡ – zeros and ones – to represent one of two states at any given time

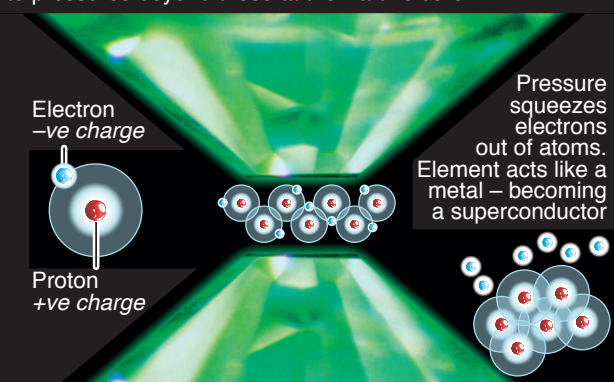
‡One bit (right).  
Two bits (below)

At the sub-atomic level, qubits (quantum bits) ignore traditional laws of physics. All possible lists of zeros and ones can exist simultaneously



## FIRST SYNTHESIS OF METALLIC HYDROGEN

Researchers at Harvard create **metallic hydrogen** using a **diamond anvil cell** to squeeze the element to pressures beyond those at the Earth's core

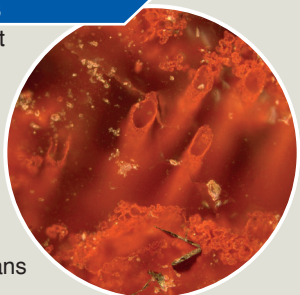


## WORLD'S OLDEST FOSSILS

Researchers led by UCL report evidence of the oldest forms of life on Earth.

Fossilized microorganisms discovered in hydrothermal vent precipitates in the **Nuvvuagittuq belt**, Quebec, Canada, lived between 3.8 and 4.3 billion years ago.

This was not long after oceans formed, 4.4 billion years ago



## ARTIFICIAL PHOTOSYNTHESIS



Chemists at Harvard have created a **bionic leaf** which uses solar energy to power a cobalt phosphide catalyst that splits water into oxygen and hydrogen.

**Ralstonia eutropha** bacteria feed on the hydrogen and convert CO<sub>2</sub> in the air into isopropanol fuel

## BIGGEST EVER DINOSAUR IS NAMED

**Patagotitan mayorum**, the largest dinosaur ever to walk on Earth, is officially named by researchers at the palaeontology museum in Argentina.

They discovered the fossilised bones of six young adult dinosaurs in a Patagonian quarry in 2014



A plant-eating creature, it weighed 69 tonnes, averaged 37 metres long and was nearly six metres high at the shoulder.

It lived about 100 million years ago during the late Cretaceous Period