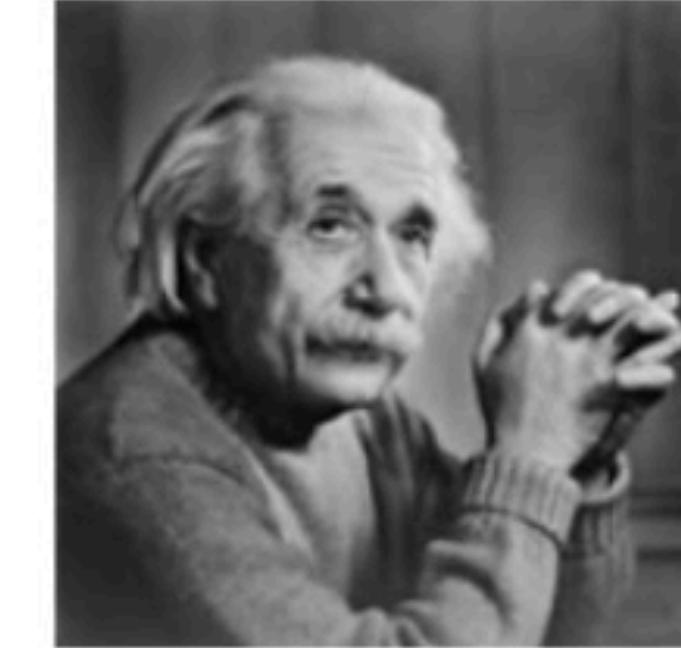
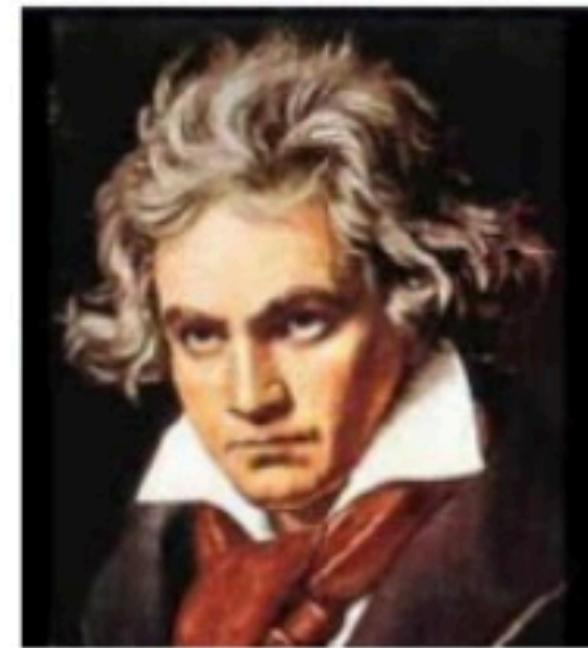


Who are they?



M I N D Q U E S T L E C T U R E S I N A N T H E M



MindQuest is a forum for people of all ages. We present and discuss on an occasional basis, subjects that increase our awareness about and understanding of the dynamic world around us - be it about science, culture, economy, or social issues.

Science breakthroughs in 2022

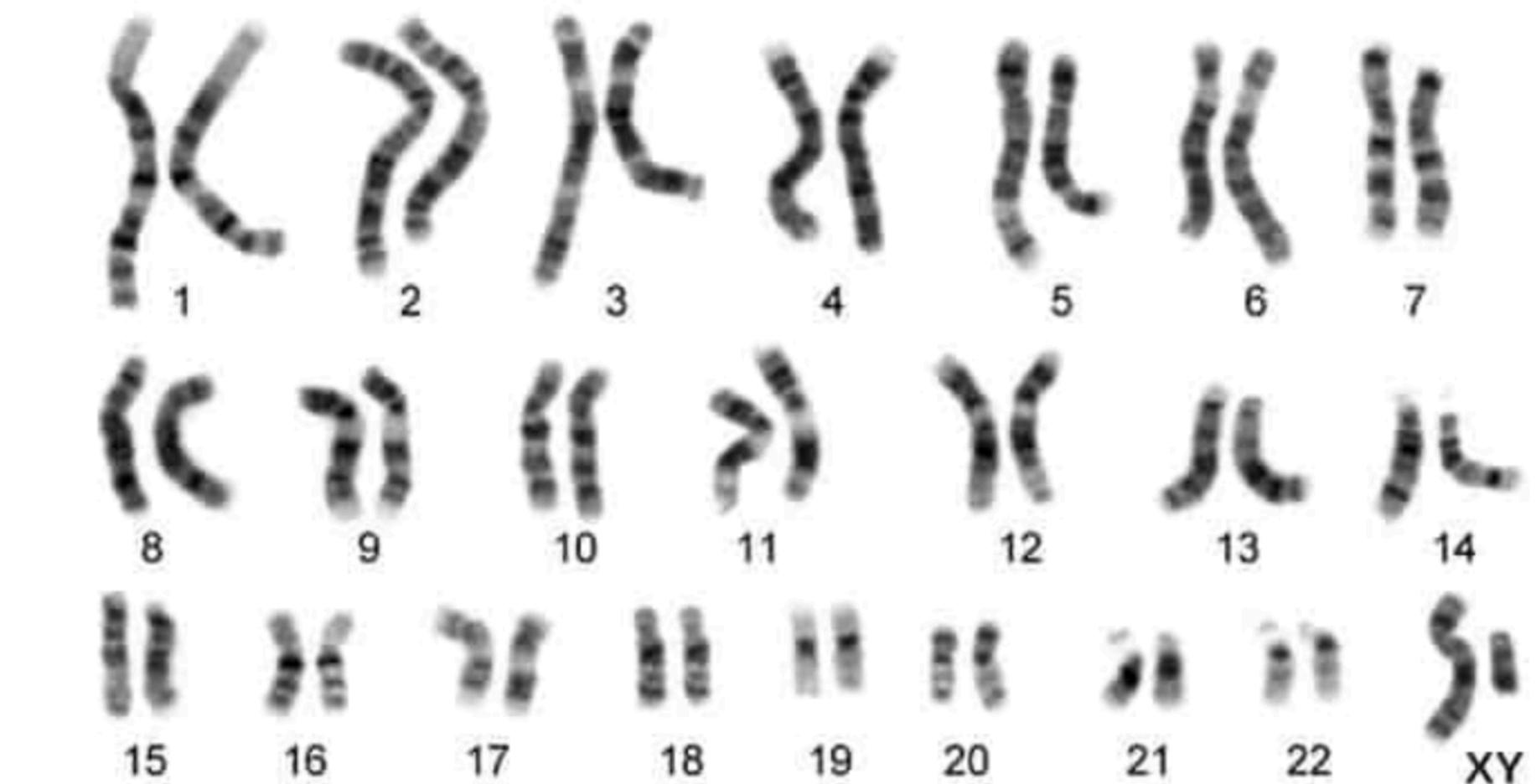
- Medical
- Energy
- Other

Medical
breakthroughs in
2022

The 100% completion of the human genome



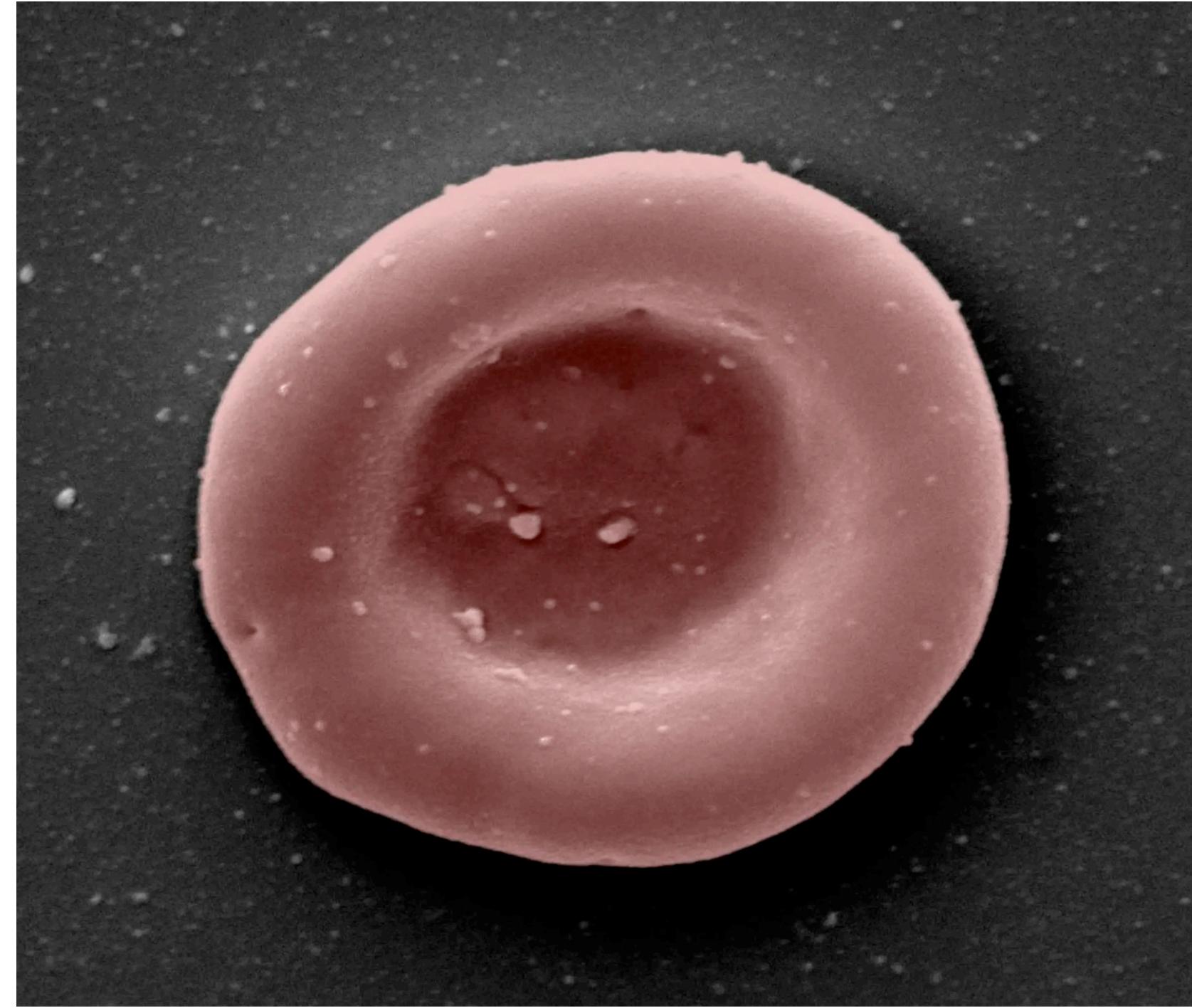
The human genome contains 46 chromosomes, or 23 pairs.



22 pairs + X + Y chromosome contains 6.4 billion bases in 3.2 Bbp

Launched in April 1990 and “completed” in Oct. 2002

Blood cells grown in a lab from stem cells



A clinical trial by Britain's National Health Service performed the [first transfusions to human patients](#) of blood cells grown in a lab.

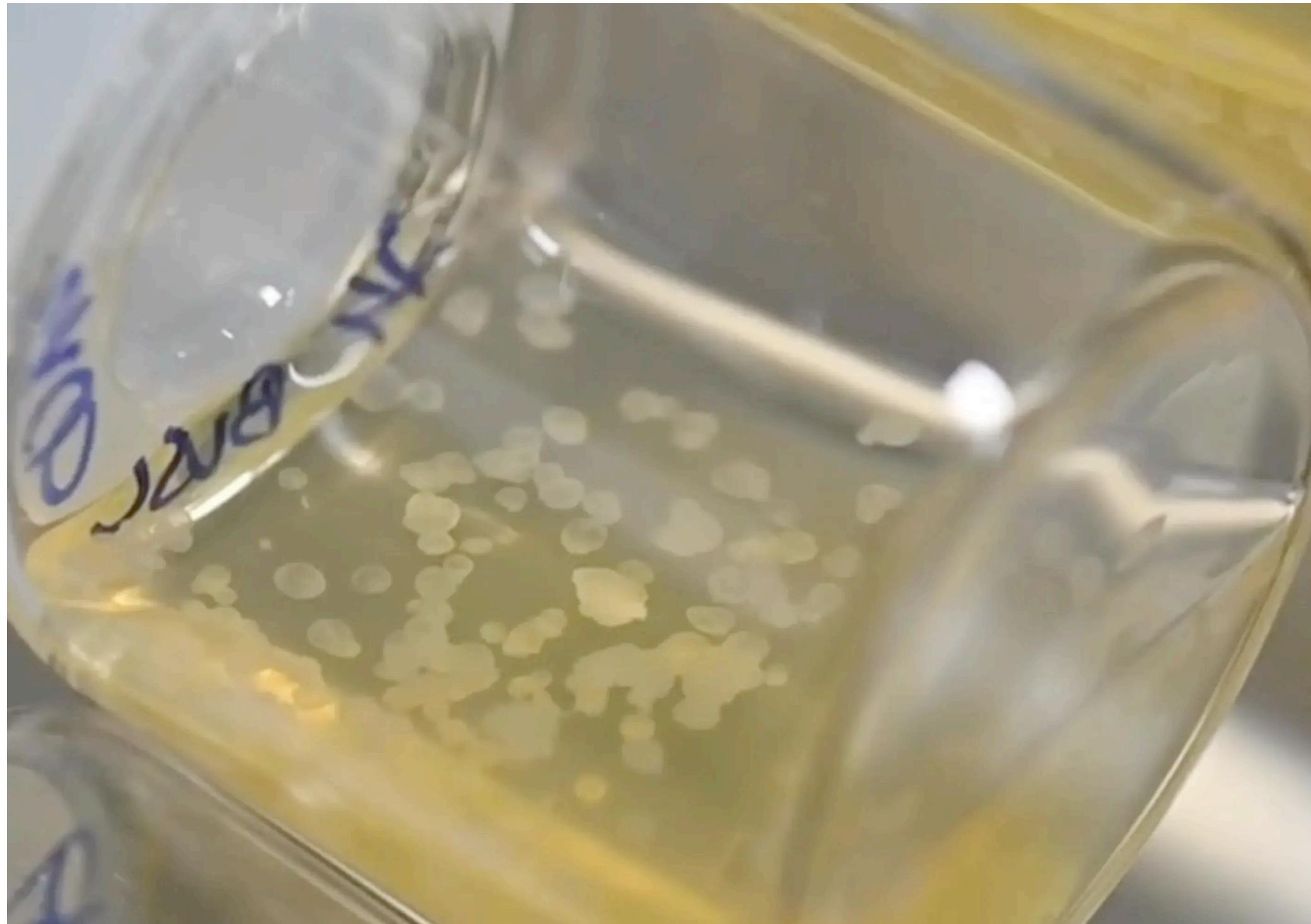
This opens the prospect of eliminating *the need for donors*,
incl. compatible donors for difficult conditions.

T-cell leukemia cured



A teenager became the first person to have their [leukemia effectively cured](#) by means of a new gene editing therapy that *added* several novel modifications to T cells supplied by a healthy donor.

Synthetic embryos grown from stem cells



Weizmann Institute of Science has created [synthetic mouse embryos](#) from **stem cells** (instead of eggs, sperm, or even a womb). This non-traditional approach opens the way for advanced medical treatments and the potential to grow transplant organs from scratch.

World-first pig-to-human heart transplant



University of Maryland Medical Center performed the [first transplant of a pig's heart to a human](#) in the US. The pig's heart was genetically engineered to reduce the threat of tissue rejection and raises the hope of one day eliminating the current chronic shortage of suitable, human heart donors.

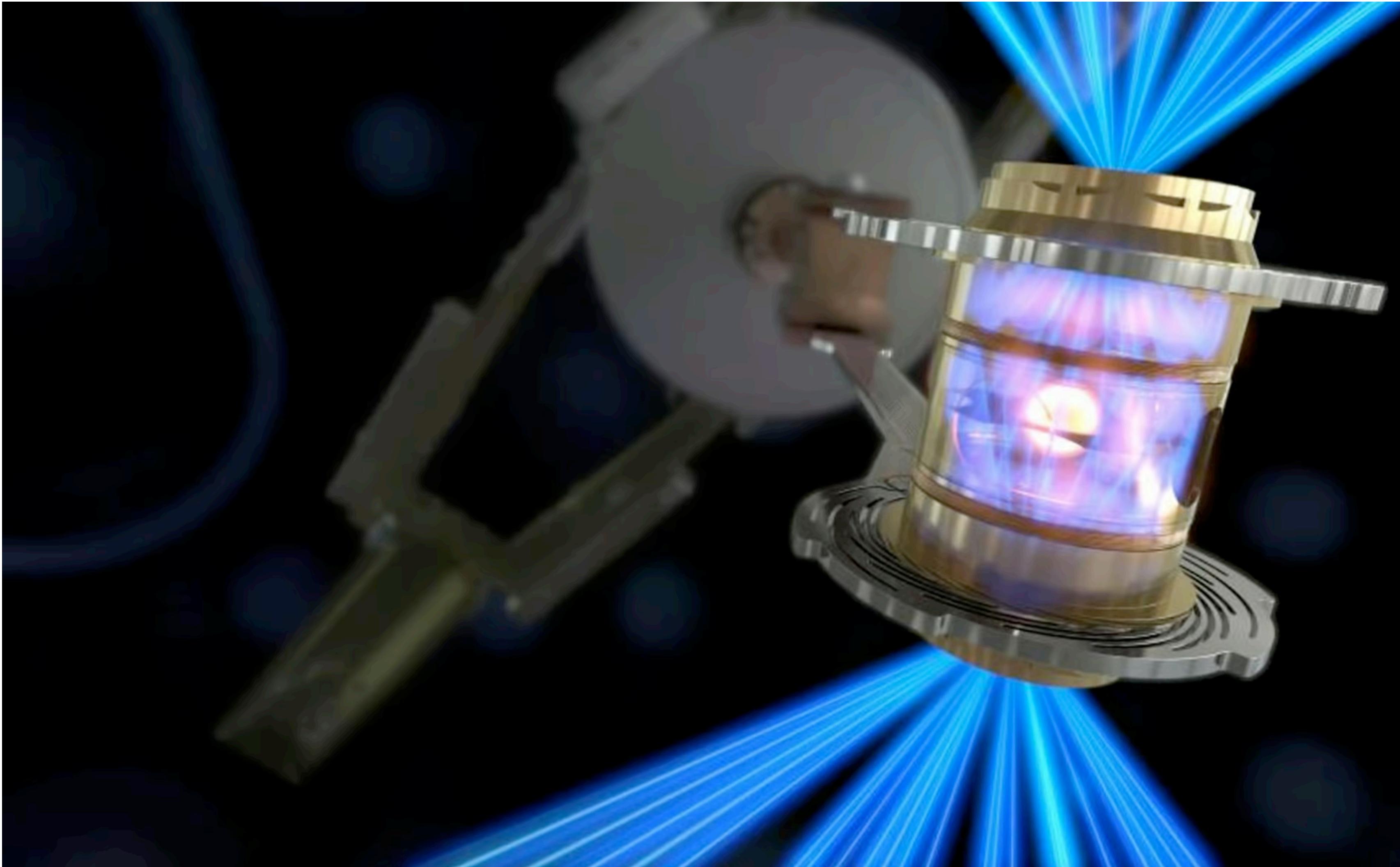
Recording of dying human brain reveals dreaming-like activity



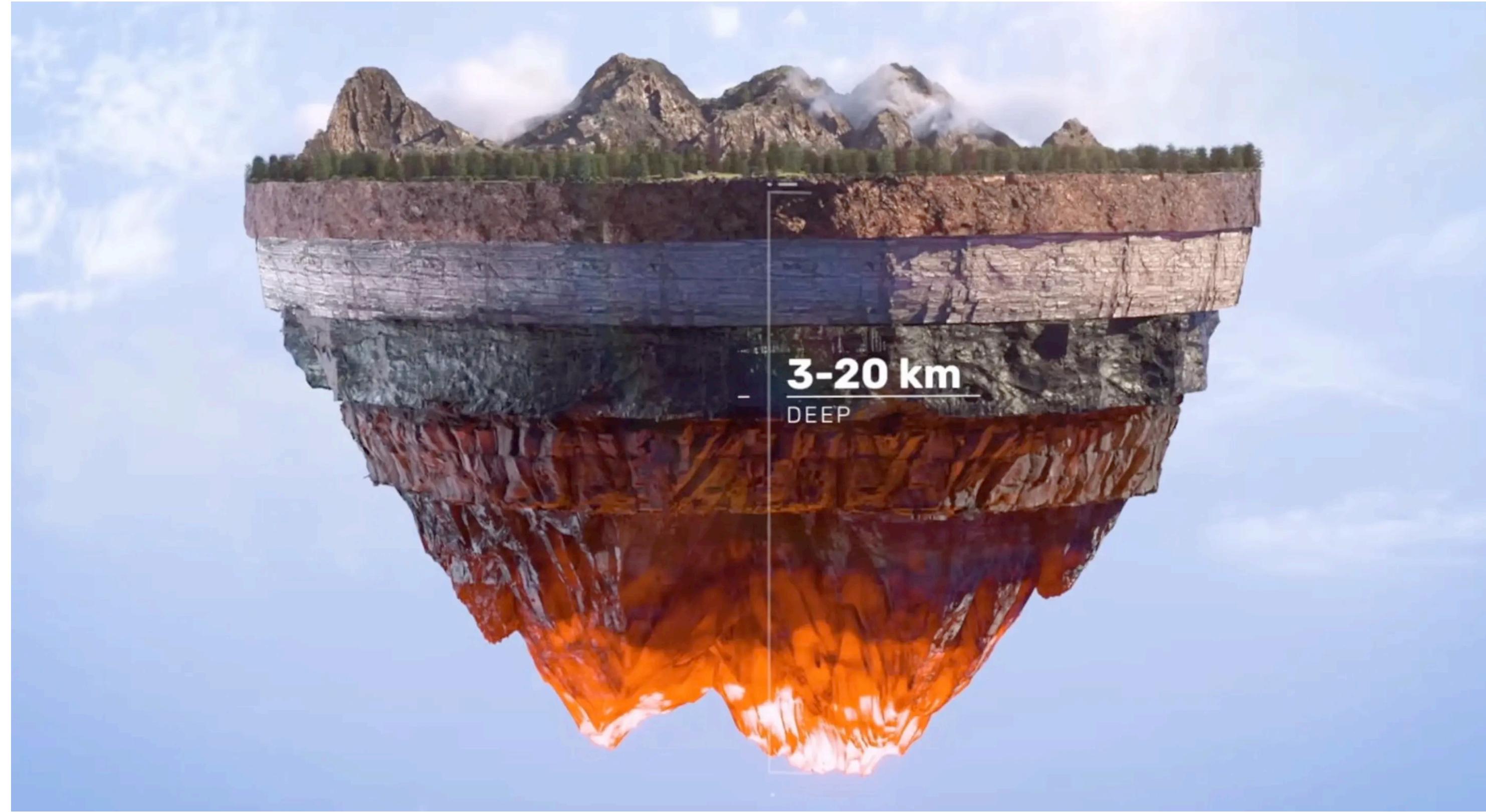
Neuroscientists at University of Louisville have made the first recording of the activity of a dying human brain. The brain wave patterns appear to be similar to those associated with dreaming, memory recall and meditation. The findings open some interesting topics for discussion.

Energy
breakthroughs in
2022

FUSION ENERGY

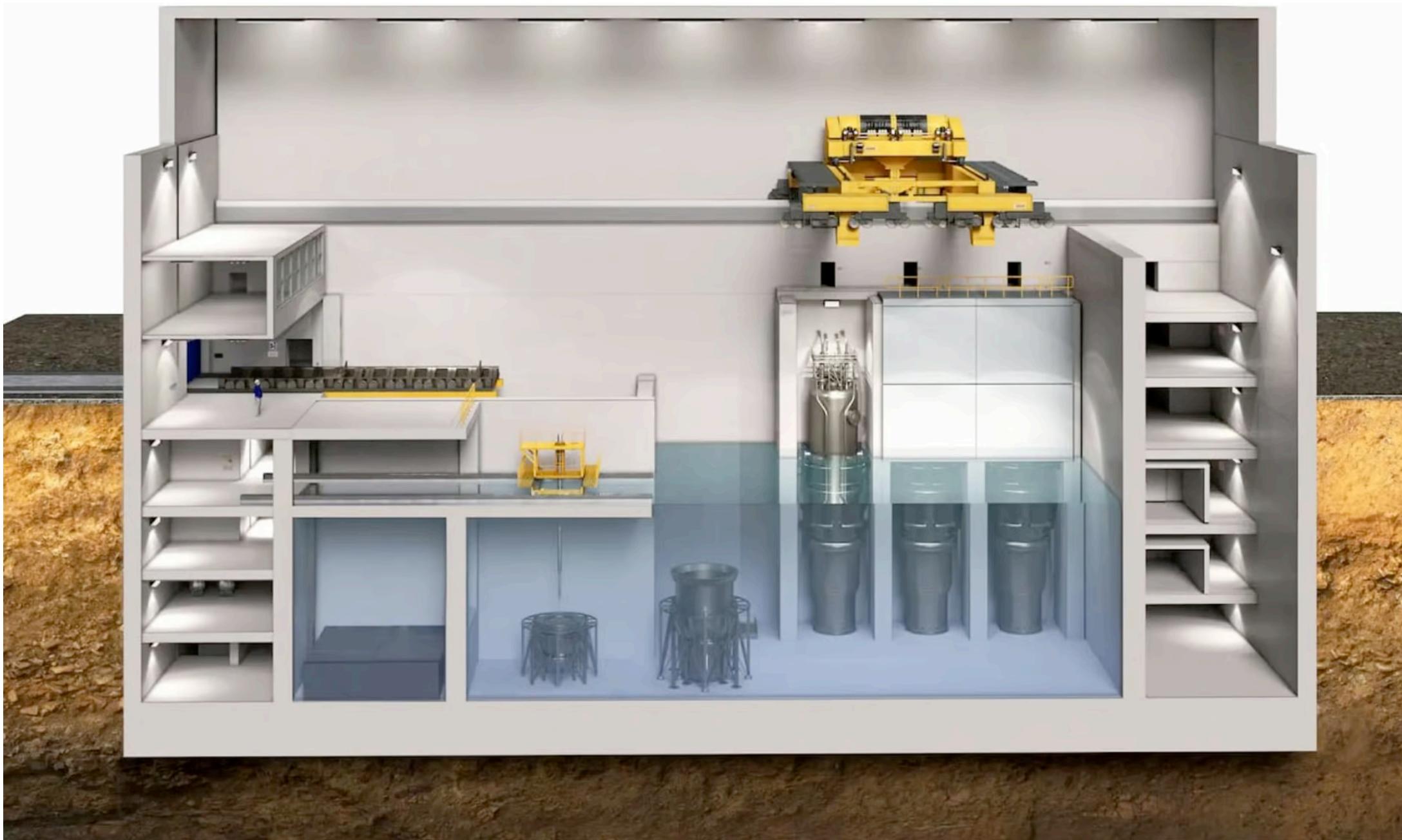


On December 5, the agency's National Ignition Facility (NIF) used 192 lasers focused on a tiny sphere of hydrogen isotopes to produce a [fusion reaction](#) that generated more energy than was pumped into it.



MIT spin-off Quiase is applying fusion energy technology in an unexpected way. Instead of trying to fuse hydrogen atoms to generate power, the company wants to use [gyrotron beams](#)* to drill holes up to 20 km (12.4 miles) deep to tap the Earth's tremendous reserves of geothermal energy. *) high-power linear-beam vacuum tubes that generates millimeter-wave electromagnetic waves by the cyclotron resonance of electrons in a strong magnetic field

The first small modular reactor



US Nuclear Regulatory Commission became the first to gain approval for a small modular reactor (SMR), giving hope to a cheap, scalable nuclear power plants tailored to local needs.

Wireless energy transfer

A microwave dish transmitter is pointed toward a rectifying antenna in part of the Safe and Continuous Power Beaming – Microwave (SCOPE-M) demonstration

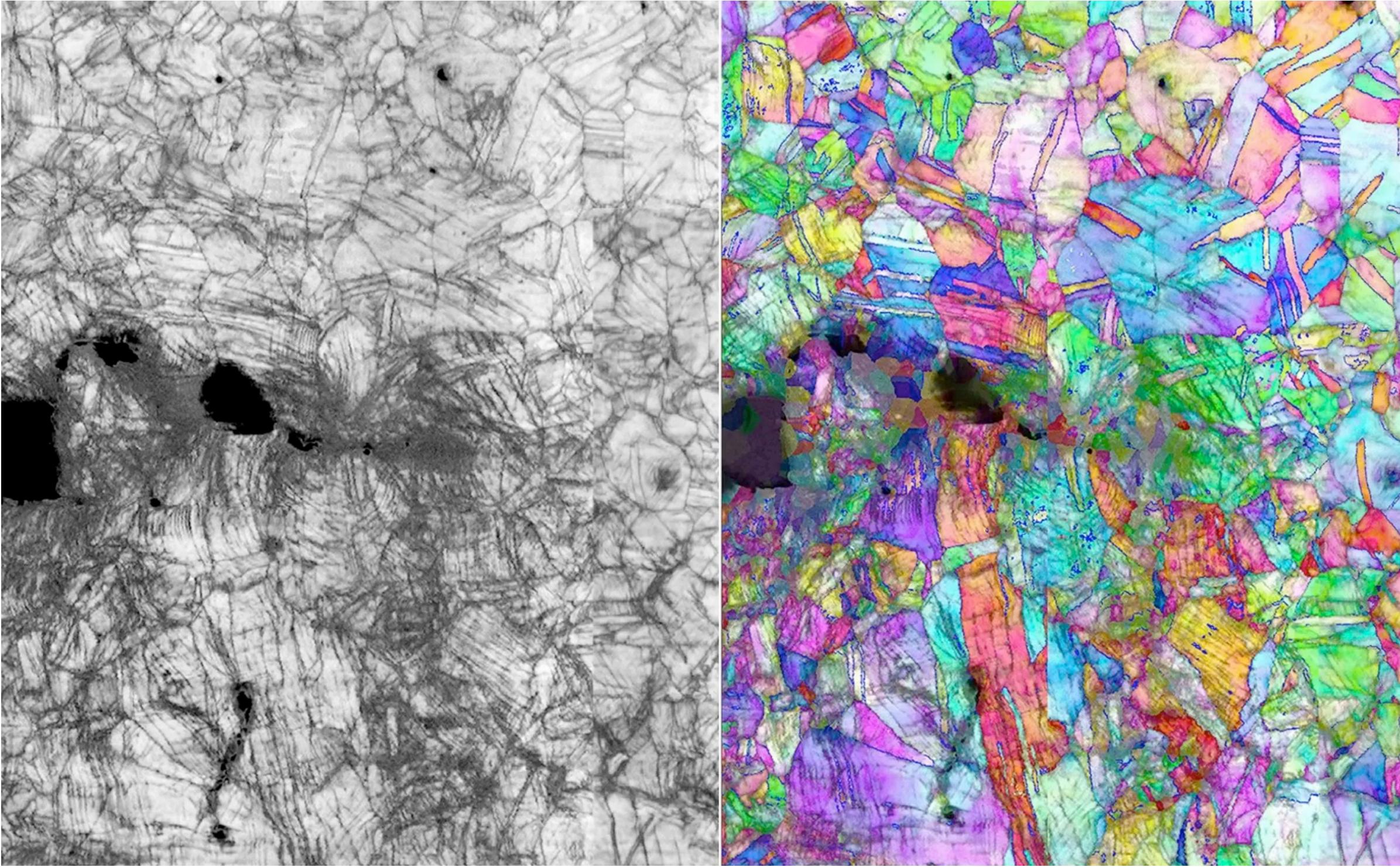


The US Naval Research Laboratory (NRL) demonstrated that its microwave system could beam 1.6 kW of power over 1 km using microwaves, opening the possibility of one day beaming power to Earth from orbital solar power stations.

Also, researchers at the University of Stavanger in Norway claim to have built a [gas micro-turbine](#) that can run on 100% hydrogen instead of a natural gas/hydrogen blend.

Other
breakthroughs in
2022

Toughest material ever recorded



A simple alloy of chromium, cobalt and nickel (CrCoNi) developed by a team at Berkeley Lab claimed the crown for the [toughest material ever recorded](#). It's not only incredibly tough, but has high strength and ductility that, oddly enough, improves at colder temperatures.

Recording of the longest ever lightning strike



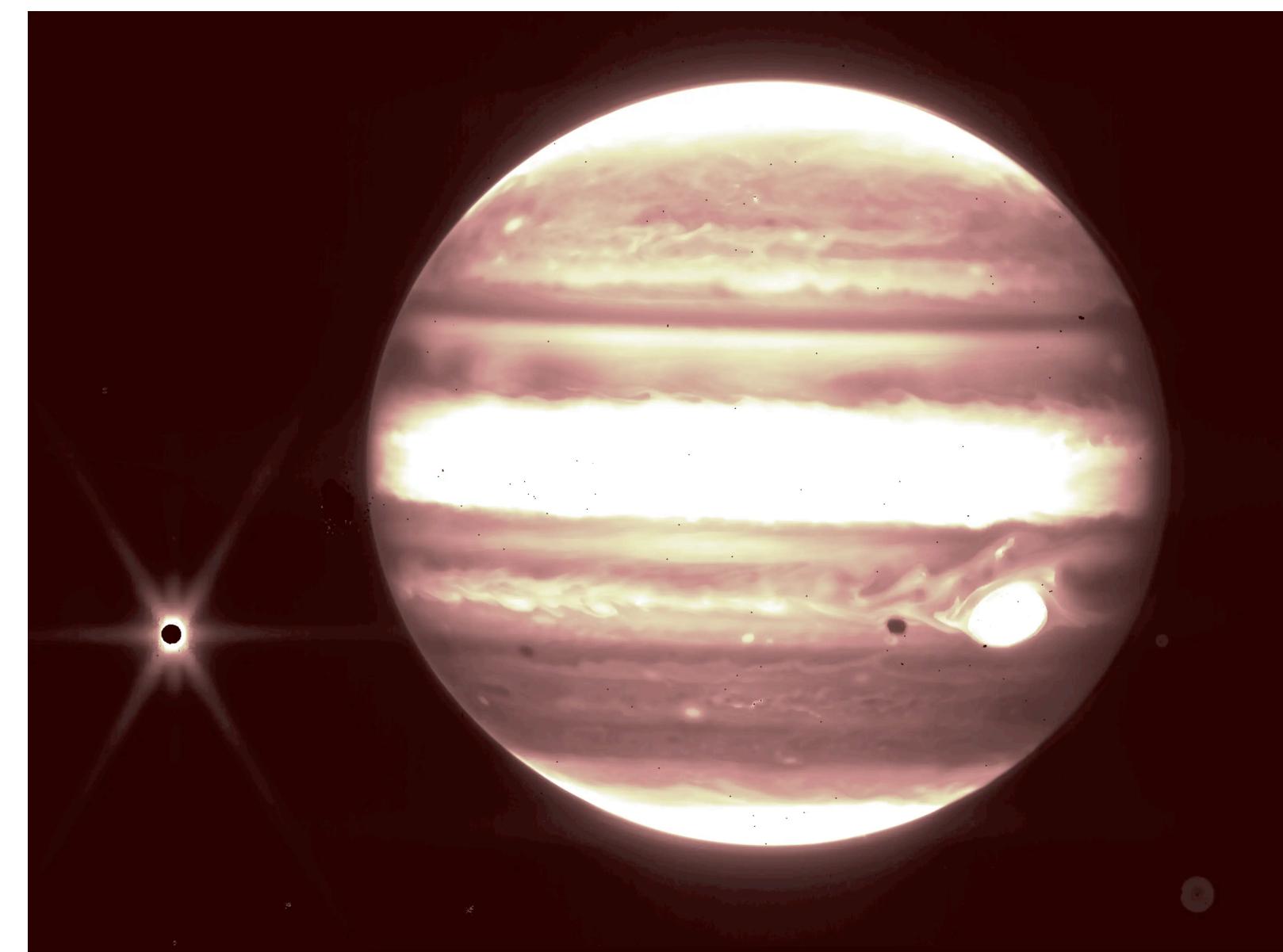
The World Meteorological Organization (WMO) certified the [longest-ever lightning strike](#). Detected by satellite, the giant lightning bolt measured 768 km (477 miles) spanning over three states.

Houses



Astronomy

The James Webb Telescope



Drones - lots of drones

