New Scientist

WEEKLY 6 January 2024

POSTNATAL ANXIETY: WHY IT'S ONLY JUST BEING RECOGNISED

COULD THE NEXT SUPERNOVA BLOW UP PARTICLE PHYSICS?

HOW 'SPEED OF SIGHT' COULD EXPLAIN SPORTING PROWESS

INTO THE INFERNO

Can the world's first tunnel to a magma chamber unleash unlimited energy?

PLUS
ARE AI LABS THE FUTURE? /
WHY CHEDDAR CHEESE TASTES SO GOOD /
PLAN YOUR STARGAZING FOR 2024

No3472 £6.95 CAN$9.99

Environment

Hurricane damage to forests could release huge carbon stores

Michael Le Page

A SINGLE hurricane hitting New England might result in the release of more than a tenth of all the carbon stored in the area's forests.

The forests of New England – which includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont – have been expanding due to a reduction in farming in the area. Woodlands now cover about 75 per cent of the land area and remove some 16 million tonnes of carbon dioxide from the atmosphere each year.

To work out the potential impact of a major hurricane, Shersingh Joseph Tumber-Dávila at Dartmouth College in New Hampshire and his colleagues looked at the 10 biggest storms to strike New England in the 20th century. The Great New England Hurricane of 1938, for instance, downed 70 per cent of standing trees in places.

The team used computer models to calculate the carbon losses that would occur if the storms happened again with the same wind speeds, or wind speeds 8 or 16 per cent higher – which could happen as a result of global warming.

A storm with the same wind speeds could down trees containing about 120 million tonnes of carbon, while one with winds 16 per cent stronger could release 250 million tonnes or so, the team concludes.

These estimates are conservative, says Tumber-Dávila. For instance, the study doesn't take into account carbon in tree roots.

The release of carbon into the atmosphere would be slow, taking 50 years for 77 per cent of the downed carbon to be emitted, and 100 years for 88 per cent to be released (bioRxiv, doi.org/k9d3).

This isn't just because it takes a long time for trees to decompose. The study assumes that a quarter of the wood is salvaged and some ends up in long-lasting products such as furniture. ▮

Astrophysics

Dark stars may be waiting inside a mirror universe

Jonathan O'Callaghan

DARK matter may occupy a mirror universe, parallel to our own – and, if so, we may be able to spot a strange kind of mirror star.

To explain dark matter, the as-yet undetected form of matter that makes up some 85 per cent of the total mass of the universe, some scientists have proposed the idea of a mirror universe.

This mirror universe would be composed of atomic dark matter, containing dark matter versions of our atoms and particles such as dark protons and dark electrons.

"Under this theory, you would get stars that are like the normal stars we see, like our sun, but they would be made of dark matter," says Isabella Armstrong at the University of Toronto in Canada. "They would emit dark photons."

The Vera C. Rubin Observatory in Chile might be able to spot mirror stars when it switches on in 2025

RUBIN OBSERVATORY/NSF/AURA/B. QUINT

Mirror stars would grow up to about 10 times the size of our sun and also have nuclear fusion taking place at their cores, except with dark hydrogen fusing into dark helium (arXiv, doi.org/k9dz).

"You would get stars that are like the normal stars we see, but they would be made of dark matter"

Normally, such stars would be invisible to us, because they wouldn't emit visible light or interact with matter in our universe. However, Armstrong and her colleagues have now proposed a way they might be seen, if they contain clumps of regular matter within them.

As a mirror star drifts through a galaxy, its gravitational pull might draw in normal matter in the form of gas from nebulae. "That gas begins to heat and emit light," says Armstrong.

Within the invisible mirror star, a "nugget" of visible matter might look quite similar to a white dwarf, the remnant cores of sun-like stars left behind at the end of their lives. But it would emit a very noticeable signal of X-rays and visible light, say the researchers. "So that's how you can tell them apart," says Armstrong.

Rabindra Mohapatra at the University of Maryland says the idea of mirror stars and a dark universe is "plausible". However, if mirror stars ever existed, they would have had shorter lifetimes than regular stars, so they might not have persisted up to now.

Burning fuel

"The density is lower in the mirror world," he says. That means such stars would have used up their fuel more quickly, with lifetimes 10 times shorter than regular stars, and formed dark matter equivalents of black holes or neutron stars at the end of their lives. "Most of the mirror stars should have disappeared by now," says Mohapatra.

The idea of mirror stars and a mirror universe remains extremely speculative. "It's a theory," says Armstrong. "We don't know these objects exist."

But upcoming telescopes might be able to search for them, such as the Vera C. Rubin Observatory in Chile, which will perform a wide survey of the universe starting in 2025 that is projected to discover many faint objects.

Another way to detect a mirror star might be to see its gravitational effect on light that passes through it. "It can bend light on a small scale," says Armstrong. "A telescope like Vera Rubin would be able to look for effects like that." ▮