Saturday Citations: Mediterranean diet racks up more points; persistent quantum coherence; vegan dogs

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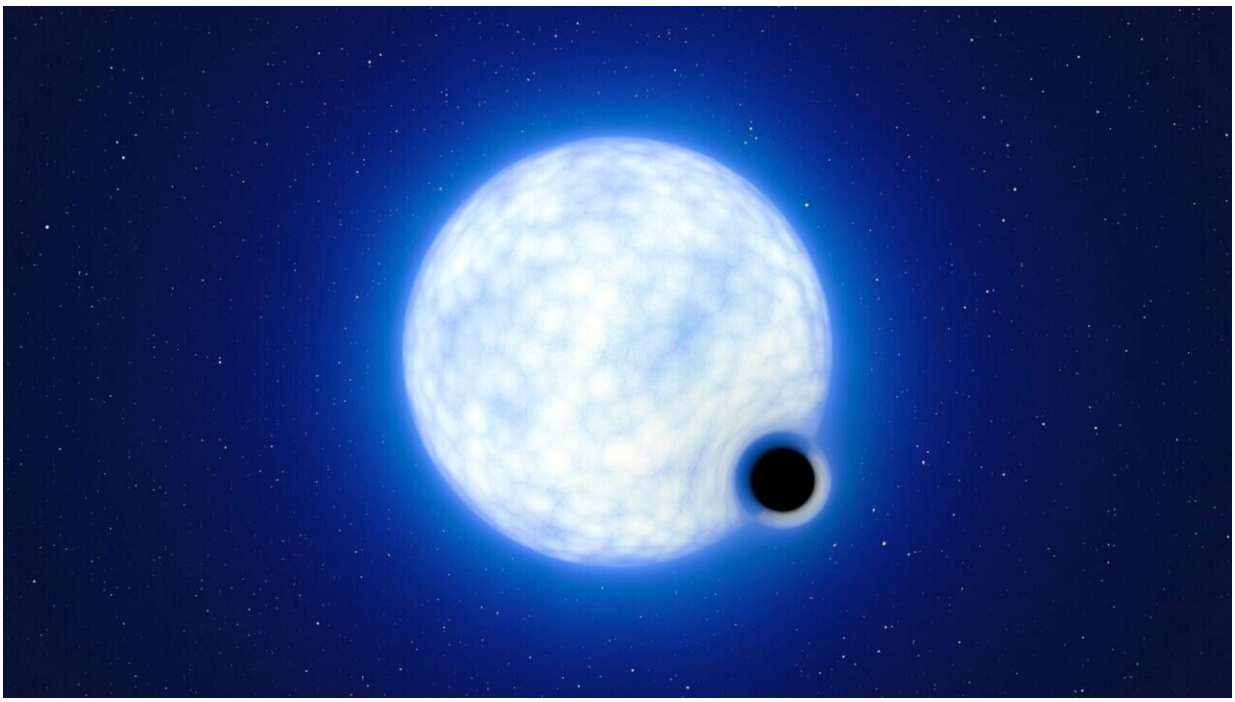

An artist's impression of VFTS 243 in the Tarantula Nebula. Credit: ESO/L. Calçada. eso.org/public/images/eso2210a/

This week, we reported on the birth throes of black holes, the questionable assertions of a study about vegan dogs and a technique for observing entanglement without breaking quantum coherence.

Neutrino predict-ino

When a large star burns off its nuclear core, it explodes in a supernova that blasts away stellar matter at thousands of kilometers per second. However, that stellar ejecta may be asymmetrically balanced, resulting in a recoil called a "natal kick" that propels a newly formed neutron star at high speeds. And astronomers have confirmed large-scale asymmetries in the remnants of supernovas that created neutron stars.

Now, in a new study, researchers at the Max Planck Institute for Astrophysics in Germany explored whether neutrino-driven natal kicks play a role in black hole formation. Through observations of a massive black hole binary system called VFTS 243, they calculate that the binary's black hole experienced a natal kick of 4 kilometers per second. Notably, this is a small neutrino natal kick, but the calculation is in agreement with theoretical predictions.

Eat this, feel better

Many studies demonstrate the benefits of eating a Mediterranean diet, including weight loss, cancer prevention, brain health, cognitive benefits that include a reduced rate of cognitive decline, gut health and heart health. But researchers are still conducting studies into this eating style, which heavily emphasizes antioxidant-rich fruits and vegetables, legumes, whole grains, healthy fats like those found in fatty fish and olive oil, and fermented foods like yogurt.

A new study conducted by researchers at the University of South Australia and the University of the Sunshine Coast now finds that the Mediterranean diet (which I'm tempted to call "eating like a grown adult person") reduces symptoms of stress and anxiety. The researchers assessed the impact of the diet on the mental health of

294 older volunteers and reported that it reduced the severity of anxiety and stress across ages, genders and body mass index.

UniSA researcher Dr. Evangeline Mantzioris says, "In this study, we showed that when older people adhered to a Mediterranean diet, their symptoms of stress and anxiety declined—and that this occurred regardless of their age, gender, BMI or how much sleep and exercise they were getting. It's a big tick for the Mediterranean diet—through a relatively easy lifestyle change, people can markedly improve their stress and anxiety levels—who wouldn't want to give it a go?"

Wave function persistent

I feel like it's my responsibility to break quantum coherence by walking around observing things, just in case there are any entangled particles driving down property values by defying classical mechanics. No wave functions in my neighborhood. Basically, quantum coherence refers to the ability of subatomic particles to exist in multiple states simultaneously. Once you measure it, it decoheres into a system that can be described only by classical mechanics. But a Harvard research team has now demonstrated that quantum coherence can persist in a chemical reaction involving ultracold molecules.

Via laser cooling and magnetic trapping, the researchers cooled potassium and rubidium molecules to nearly absolute zero. The molecules slowed, allowing the researchers to detect individual quantum states. They found that quantum coherence was preserved and inferred that the K_2 and Rb_2 molecules were entangled. By deliberately decohering the molecules, they demonstrated control over the reaction product distribution. In terms of theory, this answers longstanding questions about whether quantum coherence

can be maintained during a chemical reaction in which multiple bonds break and form.

Correlation still not causation

One of the worst things that ever happened in the 2010s was when Redditors discovered the phrase "correlation is not causation" and used it like a big Cloud Strife buster sword to smack around actual scientists discussing their work on Reddit. Scientists are aware of the inequality of causation and correlation. It's so foundational that studies are designed to account for it. Still, in an unfortunately vindicating development for insufferable science Redditors, a new study about animal diets refutes a previous study basically for confusing correlation with causation.

As the owner of a hound dog with a history of dietary indiscretion and a nose for food wrappers on the sidewalk, I'm not totally unreceptive to health claims about feeding dogs a vegan diet. A study in April 2022 recommended a nutritionally balanced vegan diet as the "healthiest and least hazardous dietary choice for dogs," but now, scientists at the University of Liverpool reinvestigated the data and found that the study did not support its claims, including associations between a vegan diet and owner perceptions of dog health.

Alex German, professor of small animal medicine, said, "On first reading this paper in 2022, it was evident that the study exclusively relied upon owner survey data and had an observational design, meaning that the associations between diet type and dog health could only suggest a possible correlation and not causality."