

Saturday Citations: Quantum coherence; rising coal emissions; 'more uses of snail mucus are being discovered every day'

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Cornu aspersum. Look at this guy. Credit: Jon Sullivan, public domain, via Wikimedia

This first week of September, researchers reported on burned-out sharks, a method for maintaining quantum coherence and some positive market news for old-timey coal barons. Plus: Snail slime is really impressive if you look at it from a molecular standpoint.

Sharks exhausted: Everyone knows the horrific effects a [great white shark](#) inflicted on the tourists of Amity Island. But does anyone ever stop to think about how the tourists affected the shark? According to a study published in *Scientific Reports*, these [negative impacts](#) probably included [stress and disturbed behavior patterns](#) typified by a zig-zag swimming trajectory associated with flight from predators.

The researchers were studying a form of ecotourism in which people pay to swim with groups of sharks, the ultimate dream of anchor-pattern-jacket-wearing Amity Mayor Larry Vaughn. Sounds weird, but it's apparently a multimillion-dollar industry. The researchers suggest that tour operators should be more cognizant of shark behavior and maintaining minimum distances from the animals.

Energy filthy: Do you have a nostalgic yearning for bygone cityscapes blighted by smoke factories and buildings covered with soot? How about a nice, sun-filtering atmosphere thick with asthma-inducing lead, [sulfur dioxide](#), nitrogen oxides and other heavy metals?

Well, hold on to your jaunty felt derby hat, because the [per capita coal emissions from G20 countries are rising](#), right now, in the year 2023, even in the face of weather extremes and promises from governments to transition to sustainable sources of energy. Listen: Do you hear annoying Scott Joplin piano music emanating from somewhere in all the carbon haze? It's like we've stepped backward in time.

Goo versatile: Imagine that you've invented a goop gun that can apply an adhesive glue, a high-viscosity lubricant and a hydrating sunblock

lotion, all from the same nozzle. Congratulations, Edison, you've been "bioinspired" by a snail's butt. Researchers at CUNY Advanced Science Research Center [published a profile](#) of the slime exuded by the Cornu aspersum snail, which has those same three utilitarian modes.

They found that of the three goo subtypes, the snail's lubricating mucus contains the lowest amount of calcium-binding proteins and its binding mucus contains the most. In a key quote from the article, chemistry and biochemistry Professor Adam Braunschweig says, "More uses of snail mucus are being discovered every day," which is honestly a great argument in favor of government-funded research if you're arguing with your uncle at a family dinner.

Noise irritating: Nuclear spin ensembles only retain their quantum states for about 150 milliseconds before they're canceled out by noise in the form of heat and other sources. Oh, were you storing some information in that quantum system? Well, it's gone, now. Good thing you backed up your data in another nuclear spin ensemble—oh, that one just decohered, too.

Noise is the enemy of [quantum coherence](#) and therefore the enemy of engineers trying to build quantum computing systems and quantum sensors. But it turns out that noise is also its own worst enemy.

Physicists at MIT now report [a method](#) to extend the period of a nuclear spin ensemble's coherence to *three gargantuan milliseconds*. The team characterized the heat noise affecting nuclear quadrupole interactions in a quantum system and used the same source of noise to offset it—as the article suggests, their system works similarly to noise-canceling headphones.

Star yummy: Astronomers using the Neil Gehrels Swift Observatory report that a sun-like star in a nearby galaxy is gradually [being consumed](#)

[by a small black hole](#). Caught in an [elliptical orbit](#) around the black hole, the star loses the equivalent mass of about three earths every time it swings close, like a hot dog on a string swinging around a beagle.

The researchers detected a bright X-ray flash emanating from [nearby galaxy](#) 2MASX J02301709+2836050, and over subsequent observations, noticed that the source would shine brightly for seven to 10 days and abruptly diminish, repeating over 25 days. All of this represents a newly discovered phenomenon one of the astronomers calls a "repeated, partial tidal disruption event," and fills in a gap in the knowledge of black hole feeding behavior.

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