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Antistars may be lurking close by

Gamma rays offer hints that some stars may be made of antimatter

Leah Crane

THERE could be several stars made of antimatter in our solar system's neighbourhood. There have been small hints that these strange and unlikely objects, called antistars, could exist, and a search for the gamma rays that they are expected to produce has now turned up 14 candidates.

When matter and antimatter meet, they annihilate in a shower of radiation, including high-energy gamma rays. This is expected to happen fairly often at the surfaces of antistars – if they exist – as regular matter falls onto them.

Simon Dupourqué at the University of Toulouse in France and his colleagues examined data from the Fermi Gamma-ray Space Telescope for objects emitting the sort of radiation expected from these annihilations that weren't already explained by some other astronomical phenomenon.

From the 14 candidates that they found, they calculated that there could be as many as one antistar per 400,000 regular stars in our galaxy (*Physical Review D*, doi.org/f8m8).

"That may seem high, but it's an upper limit," says Dupourqué. "That's assuming that all 14 candidates are antistars, but they're probably not."

There is no formation mechanism for antistars that fits into our standard model of cosmology, so it is fairly unlikely that they exist – but there are models in which they are possible, and there is one small piece of

Matter and antimatter annihilate to create a burst of energy

observational evidence that suggests they might be real.

Since it was bolted to the outside of the International Space Station in 2011, the Alpha Magnetic Spectrometer experiment has detected tentative signals of eight antihelium atoms.

The simplest way to produce antihelium is in an antistar, which would fuse antihydrogen into antihelium in the same way that a star does with regular hydrogen to make helium.

Even though antimatter annihilates immediately when

it meets regular matter, space is so empty that Dupourqué and his colleagues calculated that an antistar could survive well beyond the current age of the universe without disappearing completely.

However, if antistars exist, they are tough to distinguish from afar.

"It's not like, 'oh my god they're green!' The anti-sun would probably look similar to the sun," says Vivian Poulin at the University of Montpellier, France.

Even up close, an antistar would behave just like a regular star, except when matter fell on to its surface and annihilated to produce gamma rays. That means that proving that these 14 candidates are truly antistars is next to impossible, says Dupourqué. It would be far easier to prove that they aren't antistars, perhaps by searching for less exotic explanations for the gamma rays they give off.

If even one of them is an antistar, though, we will have to reconsider our entire understanding of the early universe to figure out how it could have formed. ■



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Human behaviour

Glancing at your phone prompts others to do it too

WHEN a person looks at their smartphone, around half the people nearby will start checking their phones within 30 seconds.

Such a rapid, automatic response is probably due to people mimicking each other without even realising it – something that scientists call the chameleon effect.

Such mimicry is thought to have evolved in human societies to help people bond with each other, but

mimicking phone use might have the opposite effect, says Elisabetta Palagi at the University of Pisa, Italy. "Smartphones can increase social isolation through interference and disruption with real-life, ongoing activities."

Palagi and her colleagues watched 88 women and 96 men in many different situations in natural settings – parks and public transportation, for example – to see how many would look at their phones if someone else nearby did.

These "trigger" individuals pushed buttons or swiped their screens for 5 seconds, either with

or without looking at the screen. The researchers themselves were usually the triggers, and the people they observed were strangers.

The researchers found that 50 per cent of people looked at their phone within 30 seconds of the trigger touching and looking at his or her phone, but just 0.5 per cent of people did so when the trigger touched the phone without looking at it. "It's paying attention

"Some 50 per cent of people looked at their phone within 30 seconds of researchers doing so"

to the phone that sets off the mimicry," says Palagi. Response rates were the same across all groups, regardless of age or sex (*Journal of Ethology*, doi.org/f764).

The mimicking behaviour wasn't just fast, but – at least anecdotally – it was also automatic and subconscious.

"One woman who was sitting across from me in a waiting room saw me check my phone, and within seconds she took out her phone and called someone and said, 'Hey, I just felt like calling you; I don't know why,'" says Palagi. ■

Christa Lesté-Lasserre