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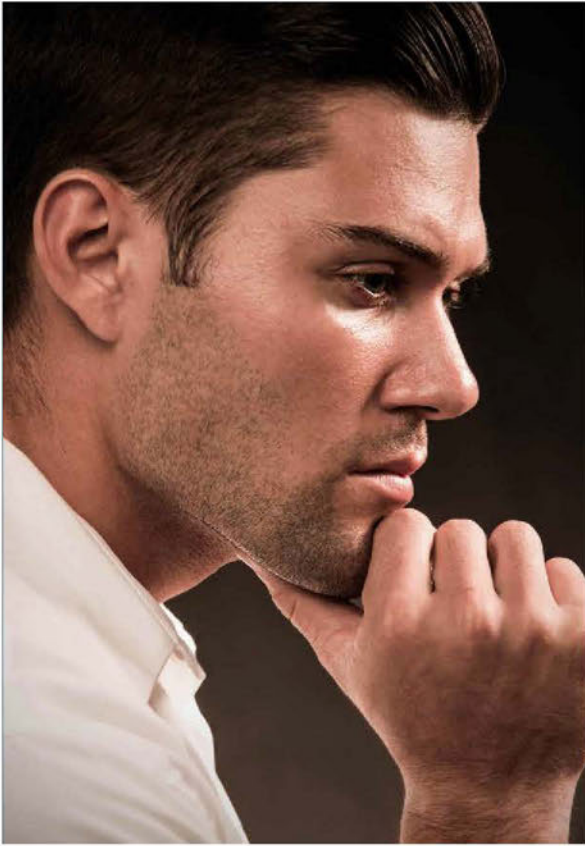
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The risks and rewards of becoming an older father



ABOVE Experts think genetics are the primary factor that determine a person's facial structure and development

→ Orthodontists have also expressed concern that the trend for mewing on social media could lead people away from traditional and better-understood orthogenic procedures.

ARE THERE ANY WAYS TO TONE YOUR JAWLINE THAT ACTUALLY WORK?

There are a number of surgical and non-surgical procedures that promise to reshape your jawline, but all come with risks and small print. These cosmetic treatments and tweakments range from fat removal under the chin to dermal fillers that pad out your jawline.

“Cryotherapy and muscle stimulation [also] give the effect of tighter, plumper skin around the neck and lower face,” says Gemma Clarke of wellness and aesthetics company Gelida, “as well as sculpting the muscles of the face to give a lifted, more youthful appearance.”

Cryotherapy uses the cold to stimulate shock in the skin, which Clarke says results in tighter skin over the neck, jowls and face. Muscle stimulation, meanwhile, is a kind of workout for under-utilised facial muscles, which are stimulated electronically. “No fillers or surgery needed,” she says.

by IAN TAYLOR

Ian is a freelance science writer and the former deputy editor of BBC Science Focus magazine.

ANALYSIS

SIGNS OF LIFE: COULD A SUPERNOVA BE A SIGNAL?

Astronomers think aliens could use supernova explosions to inform us of their presence

Imagine you're an alien on a distant planet and you're desperate to let everyone know you're there. Instead of howling aimlessly into the void, how can you give yourself the best chance of being heard? According to new research, extraterrestrial civilisations could piggyback a signal onto one of the brightest beacons in the known Universe: a supernova.

These cataclysmic explosions detonate as the biggest stars die. For a time they shine as brightly as 10 billion Suns and release as much energy as the Sun will emit in its entire 10-billion-year lifetime. When a supernova goes off, astronomers sit up and take notice.

In May this year, astronomers erupted in a flurry of excitement when they spotted the supernova SN 2023ixf detonate in the Pinwheel Galaxy (also known as M101). “It was the closest supernova in a decade,” says James Davenport, an assistant professor at the University of Washington. It was bright enough to see with amateur telescopes, even though M101 is 21 million light-years away.

A team led by Davenport has examined the possibility that an alien civilisation may choose to flag us down by coordinating their message with the light from this supernova in a ploy known as ‘signal synchronisation’. “They shout, ‘we are here’ in a conspicuous way,” Davenport says. That civilisation will know astronomers from other inhabited worlds, like ours, will probably be looking in the direction of the supernova, making the chances of that message being spotted far higher.

So where exactly do we look? The search area is defined by an oval-shaped region within the Milky Way called the ‘SETI ellipsoid’ (SETI is an acronym for the search for extraterrestrial intelligence). The aliens in question have to be nearer to the supernova than us in order for them to be able to see its light first and then have time to quickly send on an accompanying message that will arrive on Earth close to when we see the supernova. “It’s the same math[s] that goes into figuring out echoes,” Davenport says.

It’s civilisations on the perimeter of the ellipsoid that we’re most interested in. We’d have already missed the signals from those stars far inside

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“That civilisation will know that astronomers from other inhabited worlds, like ours, will probably be looking in the direction of the supernova”



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[bit.ly/SgrAblackhole](https://www.bbc.com/iplayer/programmes/p0000000)

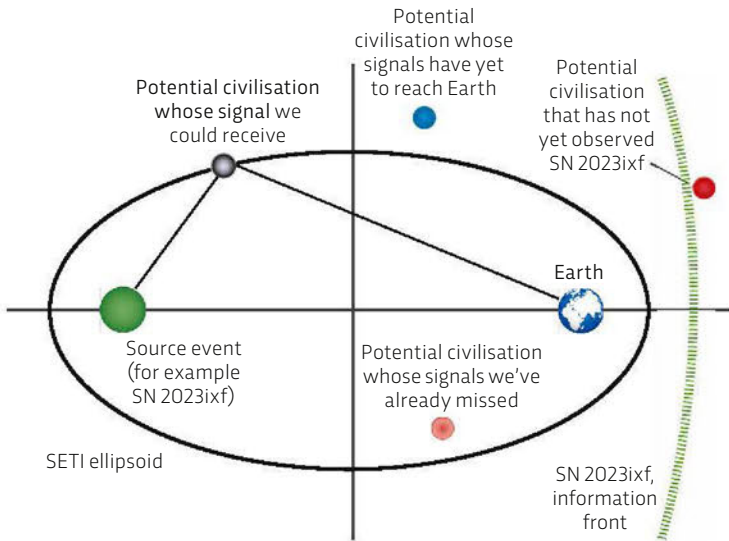
it and stars outside may have seen the supernova, but any synchronised message hasn't had time to reach Earth yet.

Working out which stars are in the right place has only recently become possible. “Missions such as Gaia have given us really precise locations of stars,” Davenport says. “There are around 100 stars currently in the sweet spot.” Armed with that knowledge, Davenport pointed the Allen Telescope Array in California at each of them over the course of a single weekend.

ABOVE Supernova events are bright enough to send light across a very wide area and be seen by anyone that may be living within it

Did he hear anything? Not yet, but all is not lost. “We’re going to revisit them a few times over the next couple of months because there’s some uncertainty over when the signals would arrive,” Davenport says.

That uncertainty stems from how quickly after the supernovae the alien civilisation would send their message. “Would they have to go to alien Congress and ask permission to send it?” Davenport asks. There could be a few weeks’ delay. Revisiting those stars also opens the door to being able to detect faint signals that slowly change, rather than taking →



ABOVE A civilisation in the right place could synchronise a signal with a noticeable event, such as a supernova like SN 2023ixf, which could be received on Earth

→ just one snatched five minute glimpse and saying nothing is there. “They could be sending a wave of information,” Davenport says.

The SETI ellipsoid is also constantly shifting to incorporate new stars as the passage of time allows both the light from the supernova and the relayed signals to travel further. So we could be scanning stars on the perimeter of the ellipsoid for years to come. Plus, SN 2023ixf is just one supernova. Every nearby supernova has its own ellipsoid to comb through.

Davenport’s work predates this most recent explosion – he originally focussed on the supernova SN 1987A. “Even though it happened nearly 40 years ago there are still stars where the [synchronised] signal would only just be reaching us.”

How does Davenport rate the chances of success? “They’re low on any given day,” he says. “My guess is that it could take us a thousand years, but that’s okay.” A millennium may sound a long time, but humans routinely do things on such timescales. The University of Bologna, Europe’s oldest, has been teaching students ceaselessly since 1088, for example.

“You have to start somewhere,” Davenport says. “It’s about leaving a legacy of data and of methodology.” Every school student today is taught ancient ideas like Pythagoras’s Theorem, which is more than 2,500 years old. The best things take time and good things come to those who wait. One day measurements of a star on the edge of a supernova SETI ellipsoid might just go down in history as one of the most important observations ever made.

by COLIN STUART (@skyponderer)

Colin is an award-winning astronomy writer and speaker.

COMMENT

OLDER DADS: ARE YOU EVER TOO OLD TO BECOME A FATHER?

What are the risks and rewards, to you and your children, of becoming a father late in life?

We’re all aware of the limits that menopause places on female fertility. But we’re perhaps less concerned with what happens to male fertility past middle age. With movie stars Al Pacino and Robert De Niro welcoming children at 83 and 79, respectively, it’s easy to assume that age is no barrier to becoming a father (the official record stands at 92). But is it really that straightforward?

The age that people become parents has been rising since the mid-1970s and is now at an all-time high, with the average age for fathers being 34, compared to 31 for mothers. As male parents are most often dependent on female partners – usually of a similar age – to conceive, this rise applies to men as much as it does to women.

But as fertility specialist Dr Sarah Martins da Silva from the University of Dundee notes, the reasons why parents – of any sex – keep getting older are complicated. “I think there’s a bigger political, socioeconomic discussion around that relating to the economy, provision of childcare and people not being so financially stable,” she says.

While women have a finite number of eggs in their ovaries, men can continue making sperm indefinitely. Male fertility does drop off with age, but it’s more of a “gradual slip”, Martins da Silva says, than during female menopause. The drop-off is partly due to lower levels of hormones; testosterone, for example, is thought to decrease by as much as two per cent per year after age 30. Past 40, levels may vary more from person to person, but, on average, they don’t continue dropping, according to one large study.

Sperm numbers and quality do slowly decrease with age, however. Sperm quality covers a combination of different factors. For example, sperm cells produced by older men may be poorer swimmers and therefore less likely to reach and fertilise an egg.

Underlying these changes are genetic changes that accumulate during any person’s lifetime and that can’t be avoided or reversed, no matter how much you try to live a healthy life. The upshot is that while it’s still eminently possible for an older man to father a child, it won’t necessarily be as straightforward as it would be for a younger man.