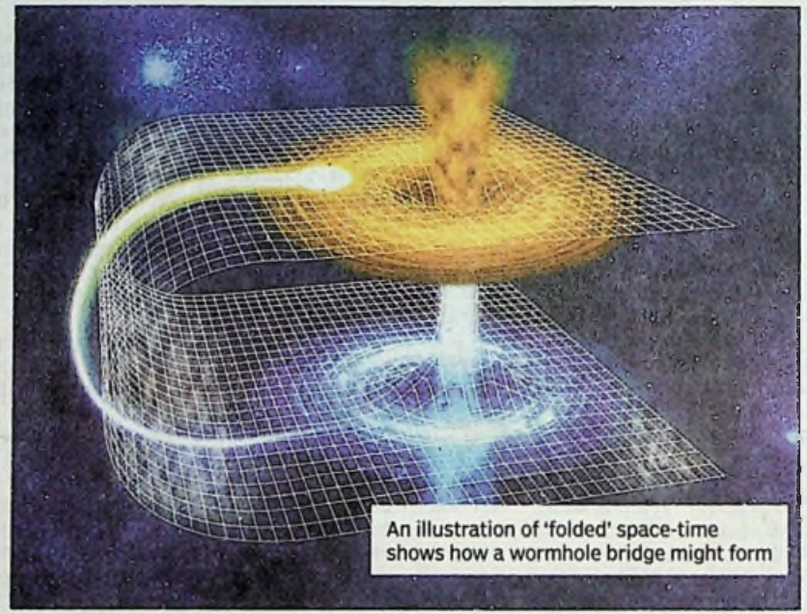
How to peer through a wormhole

Theoretically, the universe may be riddled with tunnels through space and time. Scientists have now proposed a way to detect the existence of a cosmic escape hatch

In science fiction, wormholes — tunnels through space and time — have long been the preferred means of travel across the universe. One simple version of a wormhole called an Einstein-Rosen bridge, consists of a pair of black holes stuck back-to-back, each facing out into its own realm of the universe or universes and connected by a 'throat' — the wormhole. But nobody knows if wormholes exist. If wormholes did exist, they wouldn't let you go anywhere or even send a message. The moment you tried, the wormhole would crush you.



An illustration of 'folded' space-time shows how a wormhole bridge might form

Imploding wormhole

To prevent a wormhole from imploding, it would have to be filled with an exotic substance, sometimes called phantom energy, that exerts negative gravity. But most scientists think the laws of physics forbid such a substance.

"To get a stable, traversable wormhole, you need some magic," said Dejan Stojkovic, a physicist at the University at Buffalo and a co-author of a recent paper on the topic. "Since we know nothing firm about the technologies and materials available to an advanced civilisation, we physicists have an infinity of freedom in building models for traversable wormholes," Stojkovic said.

Jump to another time & place

In their paper, published recently in *Physical Review*, Stojkovic and De-Chang Dai, of Yangzhou University in China, envisaged a layer of this exotic phantom energy-packed around the entrance to the Sagittarius black hole (Sgr A*), wedging open a wormhole through which you could safely pass. As a sufficiently small object approached the hole, and just before it reached the event horizon, it would suddenly find itself in another time and place, perhaps in another universe.

Tug from the other side

The authors proposed that their thought experiment offered a way to test if wormholes actually exist. Even if the wormhole was too small for a star or a spaceship to traverse, gravity could reach through, they contend.

"Gravity is just a property of space-time itself, so if you shake one end of it, you will feel it on the other end too," Stojkovic explained. So, a star on one side of a wormhole might feel a gravitational tug from a star or another massive object on the other side of the wormhole. To astronomers, strange deviations in one star's trajectory could indicate the influence of a 'ghost star' reaching through the wormhole from the far side.

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