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📷 Scientists currently have the best chance in history of making contact with aliens. Photograph: Graham Turner

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Teleportation, time travel and aliens - a vision of tomorrow today

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Even the most outlandish science fiction could become fact, says professor

[James Randerson](#), science correspondent

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Einstein gave hope to scientists chasing the most outlandish theories when he famously declared: "If at first, the idea is not absurd, then there is no hope for it."

He then proved the existence of black holes and the notion that time passes more slowly the faster you travel.

Now one of the world's most distinguished physicists has scrutinised some of science fiction's other concepts, such as teleportation and forcefields, and is convinced that they too can become reality.

Professor Michio Kaku, of City University in New York, has ruled out time travel for at least a few millennia, but believes invisibility cloaks and telepathy could be possible this century.

"So many times predictions are made that certain things are impossible only to find them becoming possible a decade or a few decades later," he said. In his new book, *The Physics of the Impossible*, published in the UK today, Kaku rates seemingly impossible phenomena according to how likely they are to happen.

Teleportation

When Gene Roddenberry was planning the early episodes of the cult sci-fi series *Star Trek* Paramount studios, who financed the project, said the special effects necessary to recreate ships taking off and landing were too expensive. Roddenberry needed another way to get his characters down onto the surface of the uncharted worlds they were visiting. "He said, 'we'll just beam them onto the planet and save a tonne of money'," said Kaku.

That money-saving decision did much to cement teleportation as the epitome of the sci-fi way to get around, but teleportation is actually already being done by physicists. It relies on a deeply strange phenomenon called quantum entanglement, which physicists have already used to "teleport" a photon 89 miles between La Palma and Tenerife in the Canary Island group. But Kaku concedes that Captain Kirk will have to wait a couple of centuries. "You are not actually moving the photons from one place to another because you are destroying the original. What materialises at the other end is your twin which has all the information of the previous object."

Time Travel

The Cambridge physicist Professor Stephen Hawking spent much of his career attempting to prove that time travel is impossible. If it were possible, he reasoned, why have we not been visited by voyagers from the future? But he was forced to conclude that there is actually nothing in the laws of physics that prevents moving in time.

"He changed his mind about 10 years ago," said Kaku, "There was no way to ban time travel from happening. So now he says that time travel is possible, but not practical."

The way it might work would be to take a trip through a worm hole connecting one point in space and time with another. The laws of physics suggest that the intense gravity of a black hole is enough to rip the fabric of space and time, making a worm hole possible.

"What we physicists want to do is create our own wormhole so that if you walk through the looking glass you may go backwards in time," said Kaku. Stabilising a black hole would require large amounts of an exotic form of energy called negative energy, thought to be impossible. "But we can now make it in the laboratory," said Kaku.

Invisibility

One reason why no one has met any time travellers from the future might be, Kaku suggested, because they are able to make themselves invisible. "Invisibility a la Harry Potter's cloak is no longer out of the question," he said. He rates it as the sci-fi technology that is likely to happen soonest. Perhaps the most promising new development is the creation of an exotic new substance called a metamaterial. By eliminating reflections and shadows, it renders an object invisible.

Alien Contact

Scientists currently have the best chance in history of making contact with aliens. Although humanity has been combing the skies for signs of life for decades, the search so far has been haphazard. Astronomers have detected around 300 planets in other solar systems, but these are generally large Jupiter-like planets which do not look like a good bet for harbouring life.

Satellites will greatly enhance scientists' ability to detect Earth-like planets. "We've only scanned about a thousand stars and that's nothing. We haven't even scanned the stars in our neighbourhood," said Kaku, "We hope to analyse a thousand times more data than was collected in all the sweeps of the past. And that's why we are much more optimistic that we will make contact with alien life." He thinks contact with an alien civilisation could happen within decades.

Precognition

Being able to predict the future is very difficult to reconcile with the known laws of physics. "It would set off a major shake-up in the very foundations of modern physics if precognition was ever proved in reproducible experiments," said Kaku.

The impossible takes longer: Michio Kaku's ratings

Type 1 impossibilities

Impossible today, but do not violate the known laws of physics. Might be possible this century or the next: force fields, invisibility, phasers and death stars, teleportation, telepathy, psychokinesis, robots, UFOs and aliens, starships, antimatter and anti-universes

Type 2 impossibilities

Technologies that sit at the edge of our understanding of the physical world. May be realised millenia or millions of years in the future: faster-than-light travel, time travel, parallel universes

Type 3 impossibilities

Technologies that violate the known laws of physics. If they turn out to be possible, they would represent a fundamental shift in our understanding of physics: perpetual motion machines, precognition

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