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ASTRONOMY

A trip to the stars will take a new propulsion system

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Will humans ever travel to the stars? One thing is certain: Space travel is both difficult and hazardous. Even the task of sending a human to Mars is, at present, daunting. Yet Mars is just a short hop away compared with the vast distances between stars.

Consider the following facts: The distance to our neighboring planet Mars is, at the closest juncture, about 48 million miles. For a conventional spacecraft, traveling at 25,000 mph, the trip to Mars will take more than three months. To reach the nearest star system, Alpha Centauri, with the same ship, would take about 120,000 years.

To travel to the stars, spaceships need to go faster. However, burning more fuel is not a practical way to do this. A spaceship carries its fuel, so more fuel means more mass. Once the mass of the fuel exceeds that of the payload, you don't gain much speed by adding more fuel.

A more practical way to go faster is to use ion propulsion, which spits out its exhaust gas at a higher velocity. Ion propulsion works on the same principle as particle accelerators, using electric fields to accelerate the ionized gas.

Over time, spaceships that use ion drive can exceed the speed of rockets that use conventional chemical fuel. This has been demonstrated by NASA's Deep Space 1 probe.

After exhausting their fuel, ion-drive spaceships can go about 10 times as fast as conventional rockets of equivalent mass. But it would still take 12,000 years to reach the nearest star.

A new technology being investigated is solar sails. Huge gossamer sails that reflect the sun's light could, in principle, reach speeds of up to one-tenth the speed of light, according to NASA's Marshall Space Flight Center. But proof of this concept is still years away.

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