by optical fibre. Given the spectacular progress occurring in silicon photonics, a solution may be on the horizon. Another direction would be to increase the single-shot duty cycle of the time-lens system (approximately 10^{-4}) by using dispersive elements and fast silicon-based detectors to detect the signal in the time domain, eliminating the need for an infrared camera. Such capability would provide a path to extend the time-lens approach to continuous-time operation.

Although it remains to be seen when and how these improvements will be realized, the work of the team at Cornell has already shown impressive performance and represents a novel application of silicon photonics with significant potential. ❐

B. Jalali, D. R. Solli and S. Gupta are in the Department of Electrical Engineering, University of California, 420 Westwood Boulevard, Los Angeles, California 90095, USA.
e-mail: Jalali@ucla.edu

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IMAGING

Direct observation of an exoplanet

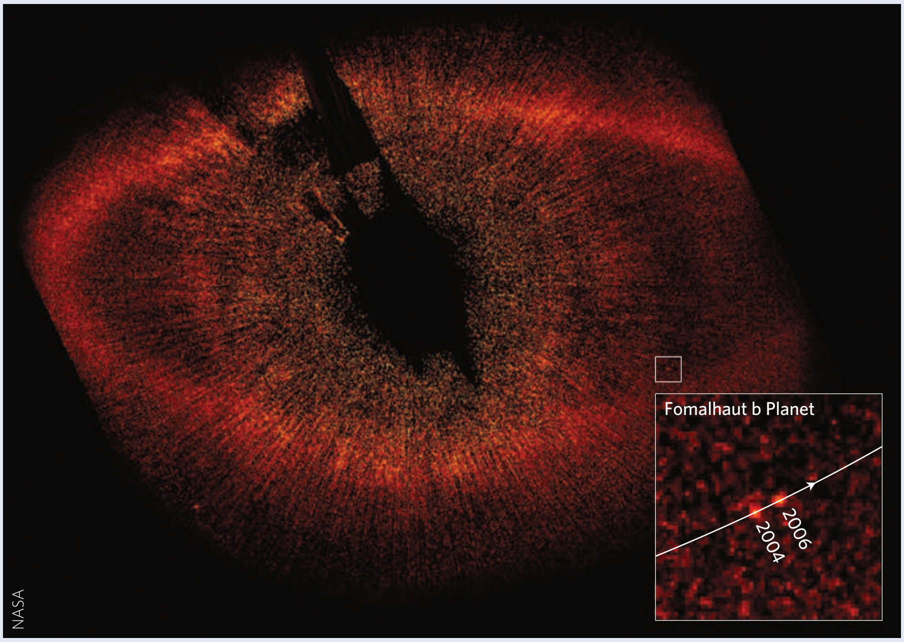
NASA's Hubble Space Telescope has captured the first visible-light image of a planet orbiting a star outside our solar system (*Science* 10.1126/science.1166609; 2008). This image shows the new planet, Fomalhaut b, orbiting Fomalhaut, a star nearly twice as massive and 16 times brighter than the Sun, and located 25 light years from Earth.

According to Paul Kalas of the University of California, Berkeley, and one of the authors of the *Science* paper, making a direct observation of the distant planet was very challenging.

"The star Fomalhaut is one of the 20 brightest stars in the sky, and Fomalhaut b is 1 billion times fainter than the star," he told *Nature Photonics*. "Therefore, suppressing the glare from the star and detecting the faint light from Fomalhaut b was extremely difficult."

The scientists got around the problem by using an imaging technique called 'coronagraphy', which effectively masks the direct bright star, allowing its corona and surrounding weaker reflected and scattered light to be observed.

The technique, inspired by the phenomenon during a solar eclipse where the Moon blocks the central disc of the Sun, was first explored by the French astronomer Bernard Lyot who made the first coronagraph in 1930.



The Advanced Camera for Surveys on the Hubble Space Telescope is equipped with a coronograph that allowed it to eclipse the star Fomalhaut artificially (cental dark area in the figure). The planet Fomalhaut b was observed at two wavelengths (0.6 μm and 0.8 μm) and can be seen in the lower right of the figure. Images taken almost 2 years apart (inset) reveal the motion of the planet and suggest that it has an orbit with an estimated period of 872 years and a semi-major axis of 115 astronomical units. All other apparent objects in the image are either stars or galaxies in the background, or false positives.

As a second success for planet hunters, Christian Marois and co-workers from the Herzberg Institute of Astrophysics in Canada also report in *Science* the ground-based capture of infrared images of three planets an impressive 130 light years away (*Science* 10.1126/science.1166585; 2008). Such ground-based observations require special adaptive optics to overcome the scattering of incoming electromagnetic waves in the Earth's atmosphere.

Apart from offering unequivocal proof of the existence of a planet, such direct imaging at near-infrared and visible wavelengths is useful because it enables spectroscopic analysis of a planet's atmosphere. Kalas's team say that they now plan to look for evidence of clouds of water vapour in the atmosphere of Formalhaut b.

DAVID PILE