

parent stars back and forth, creating a small, oscillating signal in the starlight. That technique, however, is sensitive only to massive planets—otherworldly Jupiters. But Einstein's General Theory of Relativity points to another, potentially more sensitive, way to find planets. Every concentration of mass—star or planet—bends the four-dimensional fabric of space-time. "It's like putting a bowling ball on a mattress," explains co-author Andrew Becker, an astronomer at the University of Washington, Seattle. Just as the path of a marble curves as it rolls past the bowling ball, he says, light itself bends when it passes near a star or planet.

This effect comes into play when a dim star in our galaxy passes almost directly between Earth and a second star, something that happens "about once per star per few hundred thousand years," estimates astronomer Penny Sackett of the Kapteyn Institute in the Netherlands. The gravitational field of the intervening "lens" star bends and magnifies light from the background star, a process called gravitational microlensing. By observing tens of millions of different stars every night, several search teams are now regularly observing this tell-tale stellar brightening, which reveals clues to the nature of the intervening lens object.

When a single star acts as the lens, the background star simply brightens and fades, but a binary star has an irregular gravitational field that creates a pattern of bright and dark regions, "kind of like the bright lines at the bottom of a pool" in sunlight, says Becker. Such complicated twinkling "has been observed many times in the past several years," says Sackett, "and in each previous case, a good model was produced with a simple two-lens system." And then along came MACHO-97-BLG-41, which had an exceptionally odd twinkle.

Within 10 days of its discovery on 19 June 1997, by the Massive Compact Halo Object (MACHO) survey team, astronomers realized that the flickering of MACHO-97-BLG-41 was too complex to result from a single-star lens. The Microlensing Planet Search collaboration began monitoring the 100-day-long event in collaboration with MACHO and the Global Microlensing Alert Network. At first astronomers thought they might have detected a planet around a single star (*Science*, 8 August 1997, p. 765). But they now report that accounting for this star's fluctuating light requires a binary system and a third object—a planet weighing three times as much as Jupiter and orbiting at about 7 astronomical units (1 AU is equal to the separation of Earth and the sun) from the two stars. "We have several hundred data points," says Becker, "and they constrain this model very well."

"It's a pretty nifty result," says University of California, Berkeley, astronomer and fel-

low planet-hunter Geoff Marcy, "but the architecture of the system is quite odd," which makes him wonder whether the planet is real. He and other astronomers say the spinning binary, with its stars just 1.8 AU apart, could create "gravitational chaos" near the hypothesized planet, perhaps flinging it from the system. But Harvard astrophysicist Matt Holman, who has used a computer to simulate how a planet around a binary star would behave over millions of orbits, says that the planet is "most likely stable. ... The planet is far enough away that it should feel the two stars as if they were one."

All the same, astronomers would like independent confirmation. A second team, the PLANET collaboration, also monitored MACHO-97-BLG-41 but is still analyzing the data. "We have a lot of extremely good data, and we see quite a bit of structure," says Space Telescope Science Institute astronomer Kailash Sahu, a PLANET member, "but we don't yet have a complete solution."

If their analysis confirms the planet, "it will add an exclamation point to the suspicion that planets can orbit outside binary stars," says Marcy. And although this planet is much larger than our own, he says, its discovery would be a boost for a technique that may ultimately detect another Earth. —MARK SINCELL
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CHINA SPY INQUIRY

DOE Blames Three At Los Alamos Lab

Department of Energy (DOE) Secretary Bill Richardson last week recommended that the former director of Los Alamos National Laboratory and two other officials be disciplined for bungling a spy investigation. The move has prompted speculation that Richardson is looking to deflect blame from DOE headquarters, and it has placed a spotlight on the lab's contractor, the University of California (UC), which must formally discipline the officials.

Richardson handed down his verdicts on 12 August, declaring that a new report on the incident by the department's Inspector General "makes it clear that DOE political and career management failed to give necessary attention to counterintelligence and security. ... There was a total breakdown in the system and there's plenty of blame to go around." Congressional investigations and internal DOE reviews revealed that a 3-year investigation into suspected espionage at the lab, which focused on computer scientist Wen Ho

Lee, was crippled by a host of errors. They include a failure to look closely at suspects other than Lee and communication lapses that allowed the Taiwan-born researcher to have access to classified information for months after he was supposed to be moved to a less sensitive position. Lee, who was fired in March, has denied the spying allegations and has been charged with no crime.

Richardson did not name names in releasing excerpts from the classified report (home.doe.gov/news/releases99/augpr/pr99213.htm) but said that 19 people at Los Alamos and DOE's Washington headquarters played roles in the Lee investigation. In only three cases, however, was the evidence of mismanagement "sufficiently strong" to warrant disciplinary action. Congressional sources told *Science* and other media that the trio fingered by the report consisted of metallurgist Sigfried Hecker, who directed Los Alamos from 1986 to 1997 and still works there as a scientist; Robert Vrooman, a retired chief of counterintelligence at the lab who now works for an outside contractor; and Terry Craig, another former counterintelligence officer still employed at the lab.

Hecker is accused of "failing to follow through on" a DOE request to limit Lee's access to classified information, while Vrooman reportedly allowed Lee to remain in a sensitive position even after Federal Bureau of Investigation agents told him in October 1997 that the suspect could be moved without endangering the investigation. Craig was cited for botching a file search for a waiver that Lee

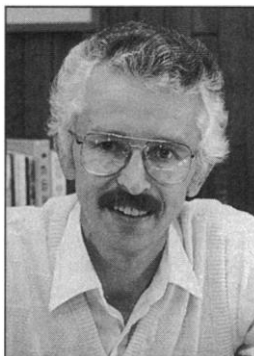
had signed that would have allowed agents to search his desktop computer. While Hecker has not commented on the charges, Vrooman told *The Washington Post* this week that the case against Lee "was built on air" and that Lee was targeted largely because of his race.

As *Science* went to press, Los Alamos lab director John Browne had not yet decided on the punishments. UC officials say it could be a week or more before they fully review the classified report, which UC President Richard Atkin-

son discussed with Richardson during a 10 August meeting in Washington.

Some of Hecker's colleagues at Los Alamos say their former director is being asked to shoulder more than his share of the blame. Noticeably absent from Richardson's hit list, says one weapons researcher who asked not to be identified, were any DOE headquarters staff. "This makes it look like all the problems were out here, and nobody in D.C. made any mistakes," he says.

—DAVID MALAKOFF



Responsible? DOE fingers ex-director Hecker.