tance of projects approved for its major research equipment account. The growing number of big projects approved by the National Science Board but not yet funded has become an irritant for Congress, which has warned NSF that it will be hard to fend off efforts to fund specific projects that are stuck in the queue unless NSF signals which are most important (*Science*, 12 July, p. 183). Colwell has told legislators that such rankings would limit her ability to adjust priorities according to the timeliness of the science, the size of her budget, and the current lineup of projects being supported.

The most objectionable portion of the Senate bill, according to Colwell's letter to Wyden, is a provision giving the science board authority to hire its own professional staff. Senate appropriators have proposed similar steps to strengthen the board's independence, and legislators in both bodies see it as an innocuous way to improve government oversight at a time when corporate boards are also being encouraged to be more accountable. But Colwell says the language "would fundamentally change" the relation between the board and the foundation, as well as create a needless bureaucracy to deal with personnel issues now handled by NSF.

Board chair Warren Washington says he can see both sides of the issue. "I don't think it's a huge impediment to our doing our business," he says. "But some members don't see a need to fix something that isn't broken."

–JEFFREY MERVIS

ASTROPHYSICS

Rings of Light Could Reveal Black Holes

The fertile mind of astrophysicist John Archibald Wheeler has conjured another nifty notion: a direct way to detect a black hole that might wander near our solar system. Sunlight would dance rings around the hole and return to Earth, briefly creating a flare in otherwise empty space. Searching for such an exceedingly rare vision might not be practical for decades, but the elegant analysis has delighted other physicists. "It's an ingenious and charming idea," says Wheeler's Princeton University colleague, astrophysicist Bohdan Paczyński.

Albert Einstein's general theory of relativity predicts that a black hole's intense gravity bends passing rays of light. Near the event horizon—the threshold beyond which nothing can escape the hole's gravitational well—this deflection becomes extreme. Some photons orbit at least once before darting back into space on new paths. Black holes thus spray incoming light in all directions, like water drops from a whirling sprinkler.

Wheeler and his former undergraduate student, astrophysicist Daniel Holz, realized that light from our sun redirected in this way could expose a black hole. If Earth sat between the sun and the hole, some sunlight would reflect back as concentric rings. Photons returning after one-half orbit (π radians, or 180 angular degrees) would create a sharp outer ring. Fewer photons would stream back after a tighter encounter of 1.5 orbits (3π radians) around the hole, forming a fainter and smaller ring, and so on. Wheeler dubbed the shadowy mirror a "retro-MACHO," after the "massive compact halo objects" in our galaxy that deflect light from more-distant stars. (Nor could he resist adding "Pi in the sky?" to the paper's title.)

Holz worked on the details for the last few years with Wheeler, who pioneered the study of black holes in the 1960s and is still active in retirement at age 91. Their results, to appear in the 20 October issue of *Astrophysical Journal*, suggest that a black hole 50 times farther away than Pluto's orbit with 10 times the mass of our sun would flare for about a day as Earth orbited between the hole and the sun. The rings would be too tiny to resolve, but giant telescopes just might catch the faint solar reflection. "It's a clean calculation," says Holz, now a postdoctoral researcher at the University of California, Santa Barbara. "If there are black holes out there, this effect would happen."

Scanning the sky for the flare is another matter. Paczyński notes that it's not feasible—at least not yet. Current telescopes could barely perceive light reflected from a hole at the outskirts of our solar system, even if they knew where to look. Further, astronomers suspect that isolated black holes typically are dozens of light-years apart, making it unlikely that one would drift nearby. "There's maybe a 50–50 chance it has happened in the history of our galaxy," says astronomer David Bennett of the University of Notre Dame in Indiana.

Holz and Wheeler acknowledge the caveats. "It's incredibly speculative, but we don't know what our telescope sensitivities will be in 50 years," Holz says. In the far future, arrays of telescopes could detect a more distant flare. Our descendants might even probe for rogue black holes with lasers that search for their own reflections—a Wheeler-esque vision indeed.

–ROBERT IRION

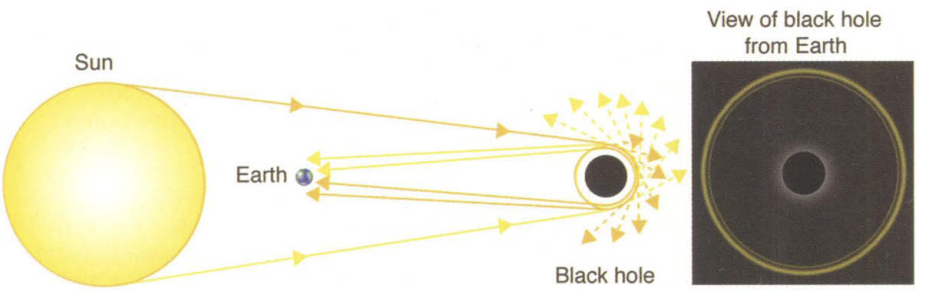

ILLUSTRATION: C. SLAYDEN

Wheels of light. Sunlight reflected from a nearby black hole would return to Earth as sharp, concentric rings, caused by light rays that orbit the hole either 0.5 or 1.5 times.

AIDS RESEARCH

Mystery Anti-HIV Factor Unmasked?

Sixteen years ago, in the relatively early days of the AIDS epidemic, virologist Jay Levy of the University of California (UC), San Francisco, proposed an answer to one puzzle about the AIDS virus and created another. He had tantalizing evidence that immune system cells secrete a chemical that can stop HIV, and he suggested that HIV-infected people who have high levels of this factor could live for decades without damage to their immune systems. This would explain in part why HIV kills at such disparate rates. But just what is the mystery factor? Legions of AIDS researchers have searched for this treasure, unearthing half a dozen different candidates, none of which has been completely convincing. Now a team led by Linqi Zhang and David Ho of the Aaron Diamond AIDS Research Center in New York City claims to have the elusive factor in hand. But other researchers who have been digging for answers and have seen the new data say they're not throwing away their shovels.

In a report published online by *Science* this week,* Zhang, Ho, and co-workers finger three tiny molecules known as α-defensins. The researchers discovered that white blood cells with CD8 receptors secrete these molecules, but infection by HIV appears to shut down production. However, the CD8 cells of people who remained unharmed by the virus a decade or more after being infected continued to produce them. "It largely solves a mystery that's been out there for 16 years," says Ho. Robert Siliciano, an AIDS virologist at Johns Hopkins University in Baltimore, Maryland, says the work is "cer-

* www.sciencemag.org/cgi/content/abstract/1076185