NRAO

A scramble to find money for the US share of operating the Atacama Large Millimeter Array is a motivating factor for a senior review. Under construction in Chile, ALMA will consist of more than four dozen antennas like this prototype.

national commitments—terrorism, the Iraq war, Hurricane Katrina. We need to know what is practical and what is not."

But broad support for the review doesn't mean astronomers aren't nervous about it. The leaders of the optical, solar, and radio observatories say their organizations are threadbare, and that despite flat budgets, they are already investing in future facilities. "It's a very delicate exercise," says Fred Lo, director of the National Radio Astronomy Observatory. "If the budget is constant or decreasing, you have to be careful not to damage the current program, since there is no guarantee the new projects will fit the funding profile."

Forming partnerships with industry, universities, and foreign countries and converting general instruments to single-purpose use are among the ideas for lowering NSF's costs while keeping telescopes running. Delaying or canceling new facilities is also possible—though the committee won't be asked how to apply any savings it achieves.

"If we can't find the free energy we need, we are in trouble," says John Huchra, vice provost for research at Harvard University and a member of the committee. "If there is no national contribution or effort as part of these new major projects—if, for example, US astronomers don't contribute to the GSMT—it would be very sad for the country. We could lose the edge we have in astronomy and astrophysics."

Toni Feder

TV Series Raises Profile of Science

In the CBS television series *Numb3rs*, science is getting a better rap than the usual "mad scientist" so often portrayed on screen. Television shows such as *CSI* and movies such as *A Beautiful Mind* have been about scientists, but *Numb3rs* is unusual in the steps the producers have taken to make sure the science is right.

The series, about a mathematician who helps his FBI-agent brother solve crimes, has proven to be an unexpected hit. Produced by the husband–wife team Nick Falacci and Cheryl Heuton, *Numb3rs* has just started a 24-episode second season after first being broadcast as a 13-episode midseason replacement earlier this year.

Falacci and Heuton, both avid readers of popular science books, had been trying to do a series on scientists for years. "Mathematicians and physicists have such an interesting way of looking at the world, and we wanted to deal with that in a narrative structure," Heuton says. "But with today's commercial TV, you most likely need to hook [a series] around crime." The unlikely hero of *Numb3rs* is Charlie Eppes (played by David Krumholtz), a mathematician based at "CalSci," a fictionalized Caltech. The character is loosely based on physicist Richard Feynman. In one episode, Eppes uses equations to plot the probable address of a serial rapist. In another, he shows how probability and statistics can reveal the source of a Spanish flu outbreak.

Eppes is helped in his crime solving by astrophysicist Larry Fleinhardt (Peter MacNicol), a character based on several Caltech astrophysicists. "Larry's office wasn't seen in the first season as we didn't have the budget or a good location. . . . This time around he will be seen more often," says Heuton. Another link to physics is provided by actor Judd Hirsch, who plays Alan Eppes, Charlie's father; in real life Hirsch holds a bachelor's degree in physics.

Scientists were initially skeptical that the show would be accurate, says Falacci, "but once they watched a few episodes and saw we were trying to use real math and real science, we've had nothing but support from the community."

For scientific advice, Heuton and Falacci hired mathematicians Gary Lorden of Caltech and Keith Devlin of Stanford University. Lorden, the main consultant, reviews scripts for scientific accuracy and provides mathematical background, including equations and language typical of academics. He also puts the producers in touch with economists, physicists, and other scientists.

How the Riemann hypothesis could be used to violate internet security protocols has been the most challenging concept to convey so far, the producers say. "It was a very complex set of ideas to put in a show for a general audience," says Heuton. The inspiration for the episode came when screenwriter Matt Witten interviewed for a job. "Matt mentioned that he had given a copy of the script to his brother Ed [the physicist]," who, Heuton says, had suggested the Riemann hypothesis to Matt as a theme.

For Lorden, involvement in the show has another Hollywood side: Students sometimes ask for his autograph. Shows like *Numb3rs* give scientists and engineers more respect among the general public, he says. "I have anecdotal evidence from teachers that teaching 10- to 14-year-olds . . . is getting a little boost because of the show." That has not gone unnoticed by the US Department of Defense, which, with an eye toward making science careers more attractive to young people, in August sponsored a workshop organized by the American Film Insti-

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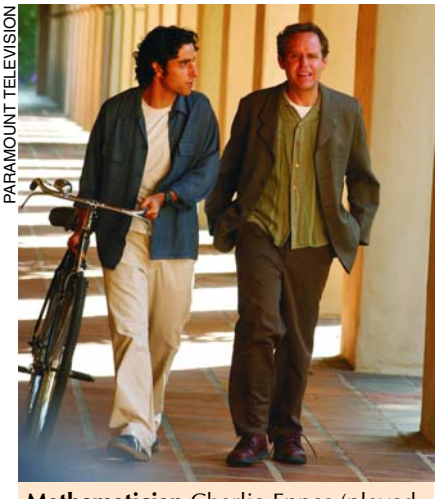

Mathematician Charlie Eppes (played by David Krumholtz, left) and physics professor Larry Fleinhardt (Peter MacNicol) are the faces of science in the TV show *Numb3rs*.

tute to help scientists sell science-based scripts to Hollywood.

Heuton, for her part, is eager to take the bait: "In the future we would definitely be looking at developing more shows that celebrate rationality, thought, intellectual progress," she says. **Paul Guinnessy**

Task Force Calls for Weapons Lab Consolidation

A US Department of Energy task force has recommended in a report that the three DOE weapons laboratories be consolidated as part of a major restructuring of the US nuclear weapons program. The restructuring would also include the design of a new nuclear "reliable replacement warhead" that "should lead to a family of modern nuclear weapons." The report was completed in July by the nuclear weapons complex infrastructure task force under the auspices of the Secretary of Energy Advisory Board.

Secretary of Energy Samuel Bodman said in early September that he couldn't comment on the specifics of the report until the end of the month, "but I have read the report and it is serious work by serious people and it makes significant recommendations that will have technical, engineering, and managerial impact." The recommendation to consolidate the labs would be politically sensitive "with leaders in Congress who have an interest in particular labs," he said. Any restructuring "will have to have the blessing of Congress."

The report calls for the creation of a "consolidated nuclear production center," to which much of the nuclear material currently at the weapons labs would be moved. The report criticizes the weapons labs—Los Alamos, Sandia, and Lawrence Livermore national laboratories—for consuming two-thirds of the nuclear weapons budget while they "routinely compete with each other and set their own requirements as justification for new facilities and redundant research funding in the fear that one laboratory may become superior."

The report doesn't specify how the labs should be consolidated, but concludes that "the status quo is neither technically credible, nor financially sustainable. Some action must be taken. The task force has proposed a path which . . . will require leadership and crisp decisions and must be molded to meet political and financial realities. The transformation should begin now."

The task force was chaired by physicist David Overskei, president of the California-based Decision Factors Inc, a complex-systems management firm. Hermann Grunder, a retired director of both Argonne National Laboratory and Jefferson Lab, and John Crawford, former deputy laboratory director at Sandia, were also on the task force. **Jim Dawson**

WEB WATCH

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http://www.genealogy.ams.org

David Hilbert (1862–1943) had 73 students. Some of those students, like Hermann Weyl (1885–1955), also had students—who had students, and so on. Hilbert's academic descendants now total 11 407. To investigate the academic family trees of Hilbert, Weyl, and other mathematicians, visit the **Mathematics Genealogy Project**.

http://www.pnas.org/contents-by-date.0.shtml

For some time, research papers in the *Proceedings of the National Academy of Sciences* have been available free of charge six months after publication. Now, free access to the journal's contents extends all the way back to volume 1, issue 1, which appeared on 15 January 1915.

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Compiled and edited by **Charles Day**