might be wise to set up a new advisory committee that reports formally to NASA, NSF, and DOE, says Peter Rosen, DOE's associate director for high-energy and nuclear physics—perhaps along the lines of SAGENAP (Scientific Assessment Group for Experiments in Non-Accelerator Physics), nine physicists who have advised DOE and NSF on projects such as GLAST.

But setting priorities is just a start. To attract funding for a major new initiative, astronomers and physicists will need to get savvy about marketing their plans, says Alan Bunner, science program director for the structure and evolution of the universe at NASA. "The added momentum of two or three agencies advocating the same initiative is hard to stop," Bunner says. "But the American people have to be engaged. Intellectual interest is not enough." He urged his audience at Sonoma State to distill the most exciting aspects of their proposed initiative and push them aggressively, both within the funding agencies and in their own communities.

Siegrist and his colleagues have charted the next few steps along this path. In February, theorists will gather in Aspen, Colorado, to discuss which future experiments have the most potential to solve fundamental mysteries in physics and cosmology. Two months later, the organizers will meet in Washington, D.C., to prepare a white paper for the directors of DOE, NSF, and NASA. If the prospects in Congress look good for a new physics-astrophysics budget initiative, the group will plan the last of its initial meetings, probably a Snowmass, Colorado, conference in the summer of 2001.

Another uncertainty may loom at that point: How well would astronomers and physicists collaborate when they face the nitty-gritty details of joint projects? "We have developed different traditions," says Rosen. "We don't have a tradition in high-energy or nuclear physics to make data widely available to anyone," because most complex detectors yield results only after painstaking analysis by the teams who built them. Astronomers, on the other hand, tend to build community instruments and quickly share what they find.

The organizers of this budding movement think these disparate fields will find a way to cooperate, because the opportunities are irresistible. "Don't be afraid to take a big step if one is indicated," Fermilab's Kolb urged his colleagues in a rousing final address at Sonoma State. "John Muir said that when one tugs at a simple thing in nature, he finds it hitched to the rest of the universe. Our laboratory for fundamental physics is now the universe itself." –ROBERT IRION

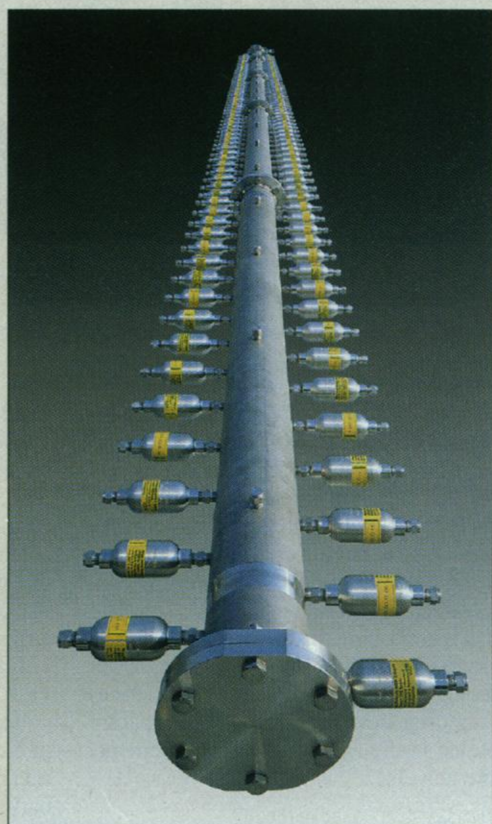
PHYSICS

Conjuring a Solitary Sound Wave

Spotted 150 years ago on the water of a canal and now routinely generated in light-carrying fibers, the solitary, long-lasting waves called solitons have now been seen in yet another medium: sound. In the 15 November *Physical Review Letters*, a team of researchers in Japan describes how they produced acoustic solitary waves by altering the propagation of sound through an air-filled tube.

In 1834 a British naval architect, John Scott Russell, was the first to spot a soliton, racing away from the prow of a boat on the Edinburgh-Glasgow Canal. Working in a 9-meter tank that he built in his garden, Russell discovered that such waves survive because they avoid dispersing. A single water pulse contains waves at many different frequencies, and two effects balance out to keep the waves from separating. Lower frequency waves travel faster and would tend to outrun the pulse—except that the steepness of the water surface within the pulse speeds up higher frequency waves just enough to compensate. Optical fibers can also host solitons, because similar effects conspire to keep light pulses from dispersing in glass. But air—the usual medium for sound waves—behaves in just the wrong way to host a soliton. The speed of sound in air varies with intensity only, not frequency, which causes intense blasts of sound to pile up into shock waves.

"Originally, my motive was to suppress shock formation in tunnels generated by the entry of a high-speed train," says Nobumasa Sugimoto of the University of Osaka in Japan. Sugimoto and his colleagues took a steel tube, 7.4 meters long and 8 centimeters in diameter, and grafted onto it 148 so-called Helmholtz resonators, which resonate at specific frequencies (see image). They sent sound pulses through the tube and tracked how the sound propagated. The team found that the pulses kept their smooth profile, without forming shock waves. What's more, the Helmholtz resonators apparently altered the sound speed depending on frequency, creating the right conditions for the acoustic solitary waves.



CREDIT: SUGIMOTO *ET AL.*

Acoustics researcher Junru Wu of the University of Vermont, Burlington, who says he tried and failed to produce acoustic solitons 15 years ago in a similar experiment, thinks the work could have applications outside the laboratory. By adding side branches like those in Sugimoto's lab to exhaust pipes and other machinery, engineers might tame noise, transforming the shocks into milder solitary waves. And because the solitary waves can transport energy steadily over a long distance, Sugimoto and collaborators at Sanyo Electric Co. in Osaka are exploring potential applications in acoustic compressors, heat engines, and even heat pumps. –ALEXANDER HELLEMANS

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