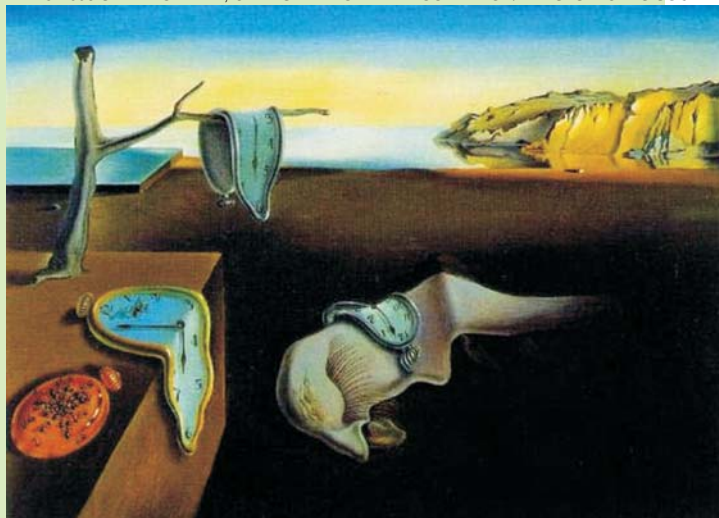




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Relative art. In Abraham Tamir's classroom, scientific concepts such as special relativity are taught with art. The apple in René Magritte's *The Listening Room* represents mass going to infinity; the clocks in Salvador Dalí's *The Persistence of Time* show time stretching; and the face in Magritte's *The House of Glass* is an example of distance shrinking at relativistic speeds.



TODAY asked Tamir about his new-found passion.

PT: How did you become interested in using art to explain science?

TAMIR: When I was about 15 years old, my parents told me to learn art. I took courses in high school, and this gave me knowledge and interest in art. After many years teaching and researching in chemical engineering, I started to get interested in the interactions between science and art.

I developed a course and taught it at our university. I teach it to students in various disciplines—they don't have to know anything about art or science. The idea is to describe scientific subjects through art—to educate people so that when they are looking at pictures, or artwork, they should try to see what scientific subject is hidden.

PT: What are some examples?

TAMIR: I demonstrate Newton's third law—action is equal to reaction. If a painting shows a person standing on the floor, he is pushing the floor, and the floor pushes back. If there were no counter force, everything would fall into the floor. The order in the universe

mass approaches infinity, thickness shrinks to zero, and time stretches. It's not so easy to understand this. However, there is a famous picture [by René Magritte] in which an apple fills the room—that can represent mass going to infinity. And there is a very nice picture by Salvador Dalí of watches oozing like Camembert cheese—time stretching. And in a painting by Magritte you see the front of a man's face from the back. In Einstein's theory this means that near the speed of light, thickness shrinks to zero. With these three pictures, I demonstrate Einstein's model.

PT: What other topics do you cover in your courses?

TAMIR: I give an introduction about art

and science. I talk about the human brain, mathematics, symmetry, perspective, and fractals. In chemistry I discuss DNA, water, and other substances. In the life sciences, botany, zoology, evolution, twins, cloning, medicine, cancer, genetics, the human body. In the natural sciences, I use artworks to discuss matter, gravity, sound, light, shadows, colors, surface tension, time, Heisenberg's uncertainty principle, Ohm's law, thermodynamics, fluid flow, and many other subjects.

PT: Your interpretations seem very subjective; what are you trying to achieve?

TAMIR: I am trying to bring to the attention of people the possibility to identify scientific subjects in artworks. In particular, I want students to gain appreciation of art and science. In my experience, once you demonstrate the laws of science with art, you remember them better. If the students wouldn't have liked the course, they would say 'You are a nice guy, be healthy,' and they would not come to my course. But the course is popular, and now I teach it at different places.

Toni Feder

New radiation detectors for US ports leave lawmakers skeptical

Acquisition of next-generation radiation-detection technology that the US Department of Homeland Security says will vastly improve customs agents' ability to counter the smuggling of

weapons-usable nuclear materials in cargo and vehicles has been delayed as Congress weighs allegations that the \$1.2 billion system hasn't been adequately tested and evaluated.

The advanced spectroscopic portal (ASP) system promises to dramatically lower the occurrence of “nuisance” radiation alarms triggered by cargo at US ports, compared with the existing radiation portal monitoring (RPM) systems. According to Vayl Oxford, director of the Domestic Nuclear Detection Office (DNDO) at DHS, between 400 and 500 false alarms occur each day at the Los Angeles–Long Beach port alone, and 200 000 are tripped annually at all US ports of entry. Another 40 000 alarms are set off at US land border crossings each year.

Oxford told the House Committee on Science and Technology that the ASP should bring the number of alarms down to between 20 and 25 per day at Los Angeles. Field tests of the ASP at the New York Container Terminal also indicated a factor of 10 reduction in nuisance alarms that require secondary inspections. The ASP employs gamma and neutron detectors to identify the specific radiation spectrum emitted by the inspected material.

An independent review team commissioned last year by DHS Secretary Michael Chertoff raised questions about the adequacy of the tests the ASP has undergone; that team supported

some of the contentions of a more critical Government Accountability Office review of the DNDO’s testing program. The independent review team’s report, delivered to Congress on 20 February, agreed with the GAO that the tests were not designed to assess the range of ASP system performance and said that test results and measures of effectiveness weren’t properly linked to operational outcomes, so it was difficult to develop conclusions from the results.

Biased?

The GAO had accused the DNDO of using “biased test methods that enhanced the test performance of the ASPs.” GAO officials told a House subcommittee last fall that the agency had conducted numerous preliminary runs of almost all the materials and combinations of materials that were used in the formal tests and then allowed its ASP contractors to collect test data and adjust their systems to identify those materials.

Further, according to the GAO, the tests didn’t use sufficient amounts of masking materials that could be used to shield radioactive materials. When that concern was raised, the DNDO declined to modify its test criteria for fear



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MoMA show explores science and design

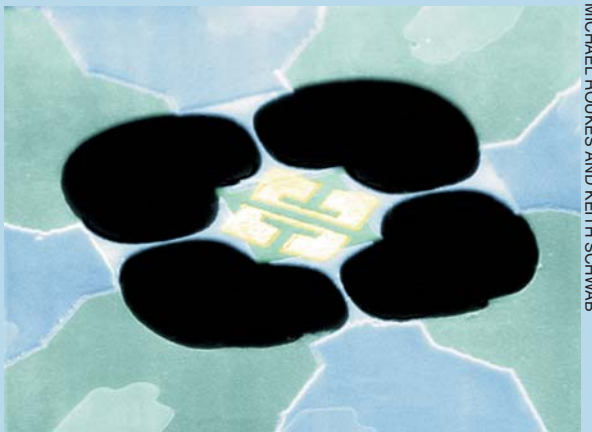
“I was looking at designers talking to scientists, and I realized that the computer has made the membrane between design and science and technology much more permeable,” says Paola Antonelli, curator for “Design and the Elastic Mind,” an exhibition at the Museum of Modern Art in New York City.

Among the exhibition’s more than 200 objects, installations, and projects is the scanning electron micrograph shown here. It shows the device that physicists Keith Schwab and Michael Roukes, then both of Caltech, used in 1999 to demonstrate quantized thermal transport (see *PHYSICS TODAY*, June 2000, page 17). Other scientific and engineering work is also featured in the exhibition. “I see a bunch of strange technology,” Schwab, who is now at Cornell University, says of the exhibition. “The artists have this conversation that is hard for me to understand.”

“People have to compute huge amounts of information every day, and we change from the individual scale to getting online and connecting to the whole world,” explains Antonelli. “That’s where the idea of elasticity came from—our minds today have to develop elastic muscles.” Using scientific advances, designers—artists, architects, fashion designers, and others—are the ones who create objects that help us take advantage of our capacity to adapt.”

The exhibition runs through 12 May; see also <http://www.moma.org/exhibitions/2008/elasticmind>.

Toni Feder



MICHAEL ROUKES AND KEITH SCHWAB

of missing a June 2007 deadline for certification of the technology by Chertoff, the GAO charged.

George Thompson, chair of the independent review team, told the House Committee on Homeland Security on 5 March that while the testing procedures “were not ideal,” the review team “did not find any evidence that the test results were thereby biased or manipulated.” The team’s report proposed that an alternative to the ASP might be to upgrade the software on the hand-held radioisotopic identification devices used to check cargo containers that have triggered an alarm when passing through one of the more than 1000 monitors at US ports. Existing monitors employ polyvinyl toluene plastic scintillator technology which cannot distinguish plutonium, highly enriched uranium, or other threat materials from naturally occurring radioactive materials such as ceramic tile or kitty litter. It can take up to an hour for Customs and Border Protection inspectors to scan an individual container with the hand-held device with the same degree of consistency as the ASP can do in 15 seconds, Oxford said. In some cases today, further analysis must be performed with help from a CBP laboratory, adding hours more delay to commerce.

Most cargo scanned

Since 8 February, CBP has been scanning for nuclear or radiological materials 100% of cargo entering the country from the Mexican border, 98% of cargo arriving at seaports, and 91% entering from Canada, Oxford said.

The GAO had first raised concerns with the testing program in 2006, which prompted Congress early last year to mandate certification of the technology by Chertoff prior to actual procurement of ASP monitors. The DNDO dutifully conducted three test campaigns and field evaluations at eight sites, while Chertoff ordered the independent review of the test procedures and results.

Representative James Langevin (D-RI), chairman of the emerging threats, cybersecurity, and science and technology subcommittee of the House Committee on Homeland Security, said the larger issue that was raised both by the GAO and the independent review is that the DNDO should not be responsible for testing its development programs. “This lack of a rigorous and independent testing program can easily lead to the development and even the deployment of ineffective equipment,” Langevin warned. Both reports are “extremely nuanced and do not seem to give clear, strong in-

dications of whether this project is achieving its stated goals,” he said. While stressing that he didn’t want the ASP program to fail, Langevin said the tests to date “have not unequivocally demonstrated in an operational setting that the ASP represents a significant improvement over current technologies.”

Oxford said he now expects Chertoff’s decision by August. Some 45 systems have already been built by vendors and could be fielded immediately after receiving the go-ahead. Others could be delivered in four to six months. Although \$1.2 billion has been authorized for the procurement, Oxford said the DNDO expects to purchase \$350 million worth of the ASPs. **David Kramer**

news notes

Third physicist in Congress. Millionaire physicist Bill Foster may be the only candi-

date for congressional office to have a section of his campaign website devoted to particle accelerators and superconducting magnets. More remarkably, the Democrat just won 53% to 47% in a Republican stronghold.

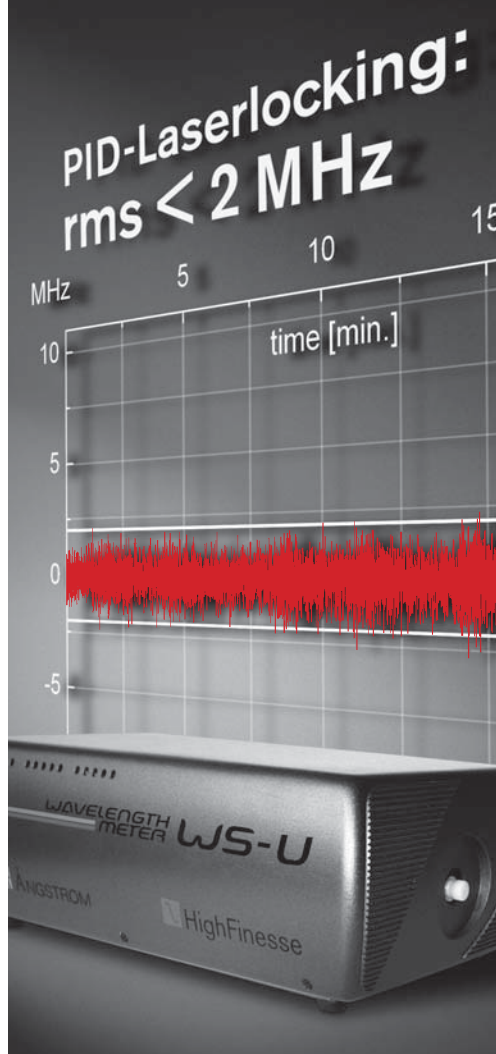
In early March, Foster defeated businessman and dairy magnate Jim Oberweis in a special election in Illinois to replace Republican representative and former Speaker of the House Dennis Hastert, who announced his retirement late last year.

“Back in the laboratory, we’d say that this was a pretty successful experiment,” Foster said in a victory speech at a banquet hall in Aurora. “We sent a clear message to everyone in Washington. You demanded change, and you are demanding it now.”

Foster founded a successful national theater lighting company, then had a 22-year career at Fermilab as a high-energy physicist. He worked on the collider detector that discovered the top quark and is the co-inventor of Fermilab’s antiproton recycler ring. Fermilab, which in recent months has had to lay off 10% of its staff, is near the heart of his congressional district.

Foster won’t have much time to become established in Washington political circles because his seat is up for grabs in November. **PKG**

Future astro missions. To prepare for the upcoming astronomy and astrophysical decadal survey, in which researchers and the National Research Council set future directions for those fields, NASA announced in February that it will fund development of 19 concepts for major new observatories. The awards total



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