

MPE's Trümper says the two teams have a gentleman's agreement to collaborate. And Rob Petre, ROSAT's US project scientist, admits "Margon is trying to offer [the MPE team] a deal. We've tried to arrange [to get the All-

Sky Survey] at the agency level. Basically, no avenue has worked." According to other US sources, SDSS is using the prospect of such a deal in seeking much-needed additional funds.

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California's Science Standards Slammed for Demanding Too Much, Too Early

It's terrible. Kids will be turned off science." Andrew Sessler, a physicist at Lawrence Berkeley National Laboratory and president of the American Physical Society, is talking about the K-12 science standards that were adopted by California's board of education on 7 October.

Development of the California science—and other academic—standards was conflict-ridden throughout. Last winter, the state's academic standards commission hired consultants from two competing groups, hoping to thus tap a wide range of views of both educators and scientists (see PHYSICS TODAY, March, page 79). But the match proved rocky. "It was a struggle all along to find common ground," says Helen Quinn, a theorist at the Stanford Linear Accelerator Center who participated in writing the standards. Now, the results of their efforts are being roundly attacked by scientists and scientific organizations.

Sessler calls the standards "over-

stuffed." The sheer quantity of material they incorporate will force kids to memorize facts, rather than learn to think analytically, he says. National Academy of Sciences (NAS) president Bruce Alberts and officials of the American Chemical Society and seven other national scientific organizations have weighed in with similar complaints: The standards stress learning facts over conceptual understanding; they will force teachers into covering subjects superficially just to get through the prescribed material; their level is too high; they ignore what is known about cognitive development; and they are not compatible with the sets of standards already prepared by the NAS and the American Association for the Advancement of Science.

Quinn agrees with such complaints. She notes, for example, that the standards require the elements of the periodic table be taught to third graders. That's too young, she says. "It's an abstract fact, and the notion that kids

learn without understanding has been shown to discourage interest in science." The problem, she adds, "is not any one fact. But by the time you've put so much in, there is no time to learn to investigate."

Quinn and others feel that the commission's choices about what to include were strongly guided by a desire to appease a minority that had the support of the project's head, Nobel laureate Glenn Seaborg (who suffered a stroke in late August and was unavailable for comment).

Not surprisingly, commission representatives defend both the standards writing process and the product. Paul Thallner, a commission staff member, notes that public hearings on the standards were held up and down California, and that three successive versions were posted on the World Wide Web for comment. "This was a public process, which can be messy, confusing and difficult," he says. "But the commission says the amount and level of content [in California's science standards] are appropriate, and grounded in the best standards from around the country and the world," including those of Japan, Singapore and the Czech Republic, where children performed well in the recent Third International Mathematics and Science Study (TIMSS).

The commission didn't take up an offer to revise the science standards made by a group consisting of Sessler, Alberts, UCLA chemist Orville Chapman, Stanford University professor Donald Kennedy, UC Davis geologist Eldridge Moores and former astronaut Sally Ride, who is director of UC San Diego's California Space Institute. The commission's Scott Hill told PHYSICS TODAY, "We don't want them revised. We have a creative, balanced set of standards."

The critics worry that textbook publishers will base their future editions on California's science standards, and that, as a result, science education nationwide will suffer.

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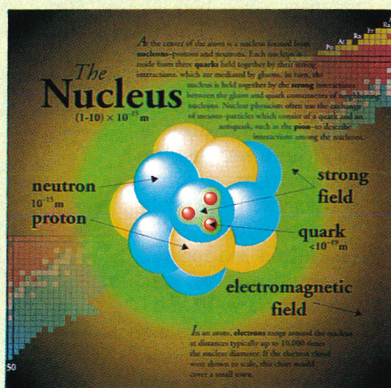
Classroom Poster Sums Up Nuclear Science Concepts

The recently released Nuclear Science Wall Chart aims to give high school and college students simple explanations of such basic (but not exactly simple) concepts as nuclear structure, radioactivity and nuclear reactions. The glossy, four-color chart also highlights recent research and applications, with sections on the expansion of the universe, the phases of matter, radioactivity and nuclear energy.

The chart and the companion teacher's guide were created by an alliance of physicists and educators known as the Contemporary Physics Education Project (CPEP), the same group responsible for the popular Standard Model wall chart. Condensing all of nuclear science into a single, visually pleasing page took some doing, says Howard Matis, a Lawrence

Berkeley National Laboratory physicist and one of the project's leaders. CPEP consulted with nuclear physicists, including the American Physical Society's nuclear physics division (which provided some funding), as well as chemists and teachers. The group is now looking to develop related hands-on activities for the classroom.

The chart (which comes in three sizes) and the teacher's guide can be ordered from Science Kit, 777 East Park Drive, Tonawanda, NY 14150; phone 800-828-7777. The chart can be viewed on the Web at <http://pdg.lbl.gov/cpep.html>. JEAN KUMAGAI



THE NUCLEUS, with a chart of the nuclides in the background, is featured on a recently released nuclear science poster.

Physics Baccalaureates: Numbers Down, Salaries Up

The number of physics bachelor's degrees awarded in the US reached a 40-year low in 1997. There were 8% fewer degrees awarded (3826) than in the previous year, and 24% fewer than in 1989, according to the latest survey of physics bachelor's degree recipients conducted by the American Institute of Physics.

But salaries for the class of 1997

rose. Those who found work in the civilian sector, for example, started at a median annual salary of \$34 800, a jump of 12% from the previous year. As in previous years, industry continued to be the biggest employer (and, with starting salaries averaging \$37 000, the highest paying), followed by the military, government and high schools. One-third of the baccalaureate class went directly on to graduate physics study, and one-fifth entered some other type of graduate program.

Dropping enrollments have hit some schools worse than others, the survey report notes, with departments that also offer a physics graduate program experiencing three times as great a decline as undergraduate-only departments. But the slide may be at an end, as junior-year enrollments appear to be leveling off. What's more, the report states, "with the well-publicized demand for graduates with computer and technical training as well as rising starting salaries for physics bachelors, undergraduate physics programs may be able to increase enrollments in the coming years."

Single copies of the 1997 *Bachelor's Degree Recipients Report*, which also includes data on US astronomy bachelor's degree recipients, are available free of charge from AIP, Education and Employment Statistics Division, One Physics Ellipse, College Park, MD 20740; phone 301-209-3076; fax 301-209-0843; e-mail stats@aip.org. The report can also be found on-line, at <http://www.aip.org/statistics>.

IN BRIEF

Russia's new science and technology minister is Mikhail Kirpichnikov, one of a handful of ministers appointed on 25 September in the country's latest cabinet reshuffling; Yevgeny Adamov remains nuclear energy minister. Kirpichnikov, the head of the protein engineering group at the V. A. Engelhardt Institute of Molecular Biology in Moscow, has been active in national and international science and education policy since 1989. Kirpichnikov's predecessor, Vladimir Bulgak, who held the post for a fleeting four months, is now vice prime minister for industry and communications, and a member of Prime Minister Yevgeny Primakov's inner circle.

To broaden the readership and cut costs, *Computers in Physics*, published by the American Institute of Physics, is merging with *Computational Science and Engineering*, a similar publication put out by the IEEE's Computer Society. The new magazine, *Computing in Science and Engineering*, will come out every two months beginning in January, and will cover computing techniques and results. Dartmouth University computer engineer George Cybenko will be the editor, and two associate editors will represent the publishing partners. A combination print and on-line subscription will cost \$49 a year for members of any AIP society or the Computer Society (see <http://computer.org/cse>); continuing subscribers will automatically receive the new publication. ■

Web Watch

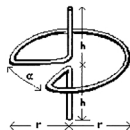
<http://www.ps.uni-sb.de/~duchier/pub/vbush/vbush.shtml>

In 1945, wartime science supremo Vannevar Bush wrote an article for the *Atlantic Monthly* entitled "As We May Think." Reproduced for the Web by Denys Duchier (University of the Saarland), Bush's article anticipates the information age and even proposes an information retrieval system that includes many of the properties of a modern Web browser.



<http://www.e20.physik.tu-muenchen.de/~cucke/ftp/lectures/sakaigir.htm>

In a diverting piece of pedagogy, physicist Christian Ucke from the Technical University of Munich explains how to make a **Sakai top** (asymmetric top) from a paper clip. As an exercise, readers are asked to derive and measure the properties of their tops.



<http://www.aip.org/pt/jobs/>

The classified job advertisements that appear in PHYSICS TODAY each month are now available on-line at the magazine's Web site, seamlessly connected to the American Institute of Physics's Job Opportunities site. Combined, the sites now offer the world's largest listing of physics jobs.

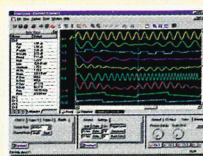


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