

bling” was changed to “parity” at Marburger’s suggestion, for example. The report was expected to be on the president’s desk by the end of October.

Defending NIH increases

Marburger, who as OSTP director is also the cochair of PCAST, said he didn’t see any inconsistencies between his earlier statements on federal science funding and the recommendations of PCAST. “I think you can defend the NIH increases and still be in favor of balance in spending,” he said. “They are not incompatible, but you cannot expect the government to do everything at once.” Beyond that, Marburger said, “the issue is not that physical sciences don’t deserve money, but putting money in one area doesn’t necessarily mean there is an imbalance. How do we know life sciences is not justified in the money they receive?”

PCAST, which consists of 23 members primarily from industry and academia, based its recommendations on a detailed study of the past 25 years of federal R&D investments. The council commissioned the study from AAAS and the Rand Corp’s Science and Technology Policy Institute. PCAST also held several hearings with leaders from industry and the scientific community.

In the report, PCAST defines the imbalance problem by saying, “Today the life sciences receive 48% of federal R&D funding compared to the physical sciences’ 11% and engineering’s 15%. Even if physical sciences, environmental sciences, math and computer sciences are combined, their total share is only 18%.” Addressing arguments similar to those Marburger made to the AAAS and Congress, the report says, “It can be reasonably argued that the increase in funding for the life sciences does not necessarily indicate an underfunding of the physical and other sciences. After all, a major revolution is occurring in the biosciences. . . .”

However, the report continues, the lack of funding in fields other than the life sciences is a concern because

- numbers of both full-time graduate and PhD students in most physical sciences, math, and engineering are decreasing while those in the life sciences are increasing

- facilities and infrastructure for the physical sciences are generally becoming inadequate for the needs of today’s research

- it is widely understood and acknowledged that the interdependencies of the various disciplines

Physics Papers Sold at Auction

Modern physics drew nearly \$1.8 million at an auction on 4 October. “It was a groundbreaking sale,” says Francis Wahlgren, head of the books and manuscripts department at Christie’s auction house in New York City. “We’ve handled Einstein before, but never within the whole context of how he fits into the works of other physicists.”

The sale’s top draw was an autograph manuscript from 1913–14, with some 50 pages of calculations by Albert Einstein and Michele Besso, in which they checked whether an early version of the general theory of relativity could account for a tiny discrepancy between predictions and observations of Mercury’s motion. (It couldn’t.) The Einstein–Besso manuscript went to a European dealer for \$559 500. One of the few items predating the late 19th century, a fragment of an autograph manuscript by Isaac Newton—some 90 words that he added to the second edition of *Opticks*—brought in the next-largest sum, \$89 625, from an anonymous buyer.

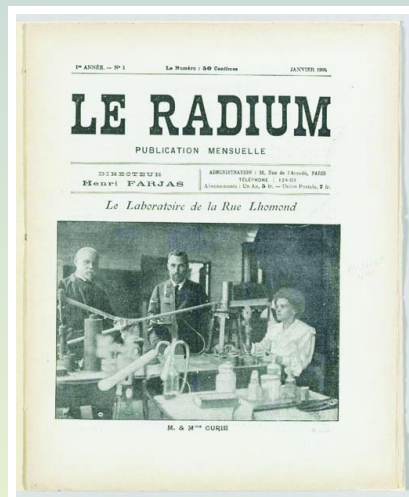
In addition to dozens of Einstein manuscripts, the sale’s roughly 3000 books, pamphlets, offprints, letters, and other papers documenting the development of modern physics were penned by Neils Bohr, Ludwig Boltzmann, Paul Dirac, Werner Heisenberg, and James Clerk Maxwell, to name a few. “There is nothing else like this in private hands,” says Wahlgren. “Apart from some institutions, you don’t see this many manuscripts of this sort together. It’s a unique collection.”

The collection had been amassed over two decades by Harvey Plotnick of Chicago. Plotnick sold his physics collection to devote money and time to another passion: early Islamic art.

require that all the sciences advance together.

“For all of these reasons it is valid to question whether the unequal support of certain disciplines jeopardizes progress in others in a significant way,” the report says. “These imbalances are not easily rectified, especially not in a constrained budgetary situation. Given the decreases in the physical sciences over the past decade, the focus must be to achieve a rebalance by increasing [funding to] these disciplines and not by decreasing the life sciences.” Although the PCAST report does not mention the dollar amounts needed to achieve parity, the Rand report says about \$7 billion in increased federal funding is needed for the physical sciences and four specific fields of engineering—electrical, mechanical, chemical, and metallurgy and materials.

In a 29 August meeting to discuss the draft report, Marburger told PCAST members that they should not try to achieve parity too quickly. Congress is still debating the FY 2003 budget, and the administration’s



LE RADIUM, the first journal to focus on radium, launched in 1904 and featuring Henri Becquerel (left) and Pierre and Marie Curie on the cover, sold for \$2868 at a Christie’s auction.

FY 2004 budget proposal is already being put together “and looks pretty tight,” Marburger said. “It’s going to be a tough year to make up a lot of ground.” The doubling of the NIH budget has taken five years, he reminded the PCAST members.

PCAST member Eric Bloch, a corporate R&D consultant and former director of NSF, told participants at the meeting that the \$7 billion figure in the Rand report “doesn’t include increased funding for math and computer science.” Those areas are also underfunded, he said, and “the figure is \$10 billion if you include those.”

The report does more than just recommend spending more money on the physical sciences and engineering. PCAST also recommends that a “major program of fellowships should be established to attract and support the advanced graduate studies of US citizens in fields of science and engineering that support critical national needs.” The report’s cover letter notes that, for the past 20 years, there has been a decline in the number of US-born students receiving graduate