

And they can readily be digitized.

Fifty years ago, our family doctor dark-adapted his eyes and examined my chest with a low-intensity fluoroscope in his office. How strange that his successors do not have a replacement for that very useful albeit somewhat hazardous device, but there is one for examining baggage!

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ROWLANDS AND KASAP REPLY: X-ray image intensifiers, or image amplifiers, an important part of radiology since the 1960s, are used primarily in fluoroscopic procedures that necessitate the interactive viewing of the inside of the body. They were invented by John Coltman at Westinghouse Research Laboratories in 1948. His key concepts were to incorporate the input phosphor screen within the vacuum tube that provides electron-optical amplification and to use a small (hence bright) output phosphor.

The earlier fluoroscopic systems mentioned by George Curtis used a nonintensified screen that had a very dim image and required one to dark-adapt one's eyes by wearing red goggles. However, because fluoroscopy requires continuous x-ray irradiation, it is no longer used for procedures such as routine chest examinations, in which visualization of motion is unnecessary.

As Curtis states, the output of x-ray intensifiers can be readily digitized. That approach, using a video camera, led to the first practical application of digital x rays, in the late 1980s. Based on sound physical principles, such intensifier systems are now well developed. However, improvement will be made possible by adoption of flat panel technology.

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Top-Ranked Physics PhD Programs in 1982, 1995 Were Mostly Same Ones

I would like to update the core findings included in a letter of mine that you published in January 1989 (page 15) under the headline "Academic Elite Meet to Inbreed."

Back then, I examined the coun-

try's 12 top-ranked doctoral programs in physics as of 1982, as determined by *Changing Times*¹ on the basis of a 1982 National Academy of Sciences study, and I found that the programs themselves accounted for 68.1% of the doctoral degrees of their faculty members. I concluded that the programs did indeed constitute an elite, and I suggested that they had maintained and enhanced their reputations by employing their own and each other's graduates.

US doctoral programs in physics were ranked again in 1995, this time by the National Research Council.² It is instructive to examine the extent to which the 12 physics programs that ranked highest in 1982 retained their high rankings in 1995 and also the extent to which they persisted in employing their own and each other's graduates.

The universities with the 12 programs and the 1982 and 1995 program rankings are as follows (note that some institutions share the same ranking—hence, for 1982, the rankings end with number 10): Harvard University, 1 and 1; Caltech, 2 and 5; Cornell University, 2 and 6; Princeton University, 2 and 2; MIT, 3 and 3.5; University of California, Berkeley, 4 and 3.5; Stanford University (physics only), 5 and 9; University of Chicago, 6 and 7; Stanford (applied physics only), 7 and not ranked in 1995; University of Illinois at Urbana-Champaign, 8 and 8; Columbia University, 9 and 12; and State University of New York at Stony Brook, 10 and 22.5.

Of the 12 top-ranked programs in 1982, 10 were still top ranked in 1995. The only dropouts were Stanford (applied physics) and SUNY, Stony Brook. Furthermore, the 6 programs with the very highest rankings in 1982 continued to rank among the top 6 in 1995.

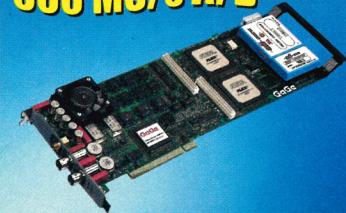
To examine the issue of who is employed by the 12 top-ranked programs, I obtained the names of the programs' full-time faculty members and their alma maters.³ I found that the 1995 median proportion of faculty members who had obtained their doctoral degrees from either their own school or one of the 11 others (as ranked in 1995) was 70.2% (the range was 41.8% to 84.2%); this is nearly identical to the 1982 median proportion, which was 69.4% (range: 49.2% to 83.0%). It is interesting to note that, given its change in ranking, SUNY at Stony Brook had the lowest percentage in both 1982 and 1995.

In sum, the most highly rated doctoral programs in physics in 1982 maintained their highly rated posi-

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LETTERS (continued from page 15)

tions in 1995 and continued to employ their own and each other's graduates—which may account in part for the stability of their elite reputations.

References

1. *Changing Times*, November 1983, p. 64.
2. National Research Council, *Research-Doctorate Programs in the United States* (1995).
3. *1995-96 Graduate Programs in Physics, Astronomy and Related Fields*, AIP, New York (1995).

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Eugene Fubini Remembered as Wise Counsel Man

The excellent obituary of Eugene Fubini by Harold Brown and Bert Fowler in your December 1997 issue (page 91) well portrays his estimable but perhaps underappreciated professional career, and I would like to add a brief note about his humanistic approach to life.

Without any fanfare, Gene took a deep interest in helping many of his younger acquaintances with their careers, particularly where he saw unrealized potential. I was one such beneficiary. In the mid-1980s, when I was indecisive about my own future, he took me aside one day after a meeting and offered to help me think things through. We then had a series of discussions over the next year that amounted to my getting very high level, *pro bono* career counseling. Our sessions revealed to me his deep sympathy with not only my situation but that of others he counseled, and with the human condition in general.

Gene's counsel was surely extraordinarily valuable to his government and industry clientele. His personal attention to individuals was fully as valuable within the context in which it was given.

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Author's Expressions Change in Reaction to Superfluidity Glitches

In our PHYSICS TODAY article "Temperature Scales Below 1 Kelvin" (August 1997, page 36), the express-

sions for the superfluid density and superfluid susceptibility given by way of illustration at the end of box 2 are incorrect. We are indebted to Joseph Serene and Tony Leggett for having separately drawn this matter to our attention. Accurate expressions are to be found in their own papers,¹ and we believe that those equations serve to support the spirit of our article, in that such quantities may be given in terms of the Landau parameters for the fluid in the normal state.

References

1. J. W. Serene, D. Rainer, Phys. Rep. **101**, 222 (1983). A. J. Leggett, Phys. Rev. A **140**, 1869 (1965).

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E-Mail Users Told of Risks of Getting a Bad Code in the Node

I would like to clarify a point made in my article "Information Warfare: A Brief Guide to Defense Preparedness" in your September 1997 issue. I stated (page 45) that "with work-processing macros embedded in text, opening e-mail can now unleash a virus in a network or a hard disk." Although not made explicit, my use of "e-mail" was intended to encompass both attachments, which can contain executable macros and other files, and basic text, which is not known to contain anything executable. Attachments can contain viruses, but there is no indication as yet that basic text can do so.

Elsewhere in the article (page 44), a photo caption claims that the North American Air Defense Command Center is located near Cheyenne, Wyoming. As sharp-eyed Victor Early has reminded me, the facility is actually inside Cheyenne Mountain, near Colorado Springs, Colorado (and individuals with acute vision can even make out the "Colorado Springs Weather" banner on one of the video monitors in the photo).

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Is it really possible to "disable one's computer by opening e-mail," as Martin Libicki claims in his September article? E-mail attachments certainly can transmit viruses and other

forms of malicious code, as he rightly says, but what about basic e-mail text? Does it have the same destructive capability? Libicki seems a bit equivocal on this specific point, so I'd like to clarify what I understand to be the current situation.

Because Java applets and ActiveX controls can be rendered dangerous and because they can be embedded in html pages, users of Web browsers that are Java- or ActiveX-enabled run the risk of importing malicious code from Web sites. Similarly, because some of the latest e-mail software is Java- or ActiveX-enabled and can interpret and read html-coded text, it is now technically possible for e-mail users to unwittingly import malicious code by opening html e-mail text.

Any such imported program is considered to be a so-called Trojan horse, rather than a virus, in that it is not self-replicating. Traditional e-mail software cannot interpret html-coded pages and is therefore immune to Trojan horse programs, as well as to viruses and hostile applets. Although I am not wholly certain, I think it very unlikely that traditional e-mail software can forward such threats to Java- or ActiveX-enabled systems.

The moral of this story, as I'm sure Libicki would agree, is that we all need to keep our virus scanners up to date, wear our protective helmets and be very, very careful.

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Corrections

January 1998, page 44—The story on Brookhaven National Laboratory should have mentioned that the lab's new contractor team, Brookhaven Science Associates, includes MIT.

January 1998, page 88—In the sentence beginning "Committees of the . . ." near the bottom of column two, the name of the first agency mentioned should have been given as the National Research Council, not the Nuclear Regulatory Commission.

January 1997, page 49—In the story about the National Research Council's report on the health risks associated with electromagnetic fields, Louis Slesin was incorrectly identified as a member of the NRC committee that prepared the report, and the last name of committee member Richard A. Luben was incorrectly given as Lubin. ■