

scribes some of these peculiar phenomena has been proposed by C. E. Chaffey and Porter.⁴ Other examples of systems exhibiting negative first normal stress difference are given by K. F. Wissburn in a review article on rod-like polymers in the liquid crystalline state.⁵ An example of a system that exhibits similar effects and does not contain rod-like polymers is described by K. W. Lem and C. D. Han.⁶ They observed negative first normal stress differences (and also sign changes) in concentrated suspension of polyethylene in unsaturated polyester resins. I am not aware of any cases in which fluids exhibiting negative first normal stress difference have been tested in non-rheometric experiments such as the ones described by Bird and Curtiss.

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2/84

More on radon hazard

Whenever possible, disagreements about facts should be resolved by appeal to data.

In November (page 13), Leonard Katzin and Robert Pohl disagree about the importance of radon release from mining tailings. Pohl refers to an EPA report, which is published—though not in a refereed journal—and which has been widely criticized. That report depends primarily upon calculation, and, as is appropriate for an agency set up to defend the environment, the calculation is designed to be—and to err—on the safe side. Those measurements referred to in the report to justify the calculations are over 10 years old and fall below the calculation.

In the last 10 years, the track-etch technique has become available to all. According to an advertisement in front of me, a measurement of the average level of radon and daughter products can be made for \$50. Radon levels have now been measured in 50 000 houses throughout the world. Some of these have levels much higher than have

been suggested near mining tailings.

This experience suggests to me that all concerned with mining tailings, EPA, American Mining Congress, Pohl and Katzin leave their offices and return to the laboratory; when the data are in, we can regulate first those places with the highest combination of human occupancy and radon level.

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2/84

Physics in decline

Recently, there have been many discussions on the educational crisis and decline in physics (September's special issue; February, page 57). Although we would like to be optimistic, our current situation should not be compared with physics before Sputnik. In 1957, the terrors of Joseph Stalin and Adolf Hitler were fresh memories. Russian tanks had just invaded Hungary. Out of despair, perhaps, many of us felt the necessity of nuclear weapons. The transistor had also been recently invented. Space physics (due directly to Sputnik) was merely the icing on the cake of nuclear and solid-state physics. Furthermore, there were no worries about huge Federal deficits, high inflation, high interest rates, foreign trade deficits, depletions of oil reserves and the decline of such basic industries as steel.

On the other hand, the current situation may be somewhat similar to physics at the turn of the century. Before Albert Einstein, H. A. Lorentz and Henri Poincaré had too many hypotheses. Today, we have too many quarks (and colors, and so on). The vacuum was filled with ether then, and it is filled with virtual photons now. Despite great efforts, experimental confirmations of key theoretical predictions have often been inconclusive (magnetic monopoles, fractional charged quarks, proton decays, electric dipole moment of neutrons, and so on). Obviously, we could use another Einstein. But Einstein might have troubles surviving today. Any research program involving relativity, photoelectric effect and Brownian motion simultaneously would be judged as incoherent. It is very difficult to write up $E = mc^2$ as a grant proposal. Lacking technical qualifications, he might not even get his patent-office job. (The director appreciated his deep knowledge of electrodynamics only after a long and grueling interview.) Such studies also require great concentration. Willard Gibbs was able to live for 15 years on the investments from a modest inheritance (the equivalent of a quarter of million dollars today, shared between brothers and sisters) without receiving

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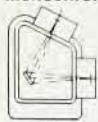
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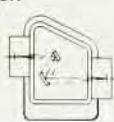
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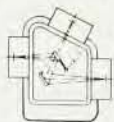
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letters

any salary from his university. Today, he would be forced to study financing and tax shelters just to prevent the quick erosion of his inheritance by inflation and tax.

Since Sputnik, APS membership has gone up threefold while the reputation of physics has changed from "brilliant" to "difficult but not necessarily exciting, with poor job opportunities." Previous discussions on these changes have appeared in the letters column (April 1970, page 10; June 1970, page 11; July 1970, page 13; September 1970, pages 13, 67; October 1970, page 9; December 1971, page 11; and so on). They are usually dismissed as cynics or Chicken Littles. There should be contingency plans for steady-state physics instead of expanding physics. Careers of physicists are far longer than those of professional football players, yet many physics departments appoint as many postdoctoral fellows every year as the draft choices of Washington Redskins. A Nobel laureate may work in any field of his or her choice, but there is simply very little room for the less talented foreign student to work on gauge field theories (either here or at home). Yet recruitment continues, and now 40% of physics graduate students are foreign. (Sometimes, graduate study is the first step toward permanent residency in the US, and there are more teaching assistantships available in physics than engineering or computer science.)

I do not advocate a defeatist attitude, yet we do need a realistic attitude toward decline. The discussion of any unpleasant subject cannot be completely pleasant.

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12/84

Soviet nuclear position

One method of attacking a scientific or political position is to characterize it as the position held by some unpopular group. Lysenko was able to use this method successfully in his corruption of Soviet genetics in the 1930s.

Suraj N. Gupta (February, page 86) complains that letters supporting the APS Council resolution on nuclear war have "defended the Soviets' position on SALT II, arms control, and nuclear freeze."

If the Soviet position on arms control supports SALT II and a bilateral, verifiable nuclear freeze, I can only be glad that the Soviets are in agreement with me and with other APS members.

EDGAR VILLCHUR

Foundation for Hearing Aid Research

3/84

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