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Journals for the taking

I have some unbound journals that I plan to discard if no one can use them: *Journal of Applied Physics*, January 1946–December 1970, (missing February 1946); *Science Abstracts* Sec. A. Physics, January 1937–December 1968.

I'll let anyone have them who will pay the cost of packaging and shipping. If interested, please get in touch. My telephone number is (412) 222-4400, Ext. 253.

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Nuclear medicine

What chords resonated on reading the letter by Robert Yaes in your issue of August (page 13)! I, too, had followed the path from physics to medicine and had been astonished by the amount of rote learning necessary to obtain a medical degree. The transition from senior faculty member to student in the same institution is a unique one, not always to be recommended. However, the choice of a final medical specialty for a former physicist requires very much care if one wants to retain some value from one's physics education. Radiation therapy, though seeming to depend on principles of physics, in fact does not do so, as Yaes has discovered. The relevant principles are automated or have become province of medical physicists. The physician has little to do with these physical principles.

However, one specialty that uses physics every day is nuclear medicine, a field that is now steadily advancing its techniques, very many of which require knowledge drawn directly from physics and mathematics. In fact, in some countries such as France, a higher degree in physics is a recognized step towards specialist recognition in nuclear medicine. Further, the recent arrival of nuclear magnetic resonance imaging is an even more fertile field for the medical doctor with a strong physics background. I am convinced this technique will become at least as com-

mon within ten years as computed tomography is today. Yet the optimal methods of using the existing machines still have not been decided. What an opportunity! I am fortunate to be involved in both these fields, and would therefore encourage physicists drawn towards medicine to look further than radiation therapy when considering a specialty. With care, a physics education can prove to be far more useful to certain medical doctors than to either a taxi driver or a radiotherapist.

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Origins of nonrelativistic spin

I was much amused by the fine note of William J. Hurley, "Nonrelativistic Spin" (August, page 80), which corrects the apparently still extant misconception that spin is a relativistic concept. Hurley correctly cites Levy-Leblond's paper[1] of 1967, but I would like to further improve the historical record by stating that the "Lévy-Leblond equation" was first derived, and all its consequences analyzed, in my PhD thesis "The linear wave equation for the nonrelativistic electron," Eötvös University, Budapest, as early as 1948. A brief summary of this was published[3] in English in *Nature*. At that time I was completely ignorant regarding the Galilei Group, so that my starting point, unlike Lévy-Leblond's, was to study directly the rotational properties of the multicomponent wave function that arose from the linearization of the Schrödinger equation. I learned this procedure for the general calculation of spin from my revered old teacher, Karl Novobatzky who, at that time, was nearly 70 years old.

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Space forces

It is a bit ironic that Jack F. Butler stated in his letter (October, page 11) that "The Soviets are oppressively and unrelentingly expansionist, bent on a senseless destructive economic system and a dictatorial government of other peoples through force, guile and the use of surrogates," after accusing Freeman Dyson of using "juvenescent" rhetoric and distortions in his recent guest comment (June, page 9). Certainly if we base our diplomatic and military policy on a Manichean world view and on paranoid delusions of Soviet capabilities and intentions, we will make no progress on arms reduction agreements. However, to achieve viable arms control and arms reduction agreements it is not necessary to assume that the Soviet leadership is "benign," merely that the Soviet leaders are sane and have as much interest in the survival of the human species on the planet Earth as do we. Perhaps the best argument against the "Star Wars" weapons system is the military's record with simpler weapons on the ground. The "Sergeant York" radar-controlled anti-aircraft gun seems to be unable to hit even a stationary helicopter unless radar reflectors are attached. The B-1 bomber crashed because the test pilot forgot to switch fuel from one tank to another, and crew members were killed and injured because the ejection capsule didn't work as planned. The gas turbine engine of the new main battle tank is so fuel inefficient that it cannot be supplied with fuel, and the new armored personal carrier has aluminum armor that will ignite when hit by an incendiary shell. It thus seems that even in low-tech military hardware Murphy's 6th law prevails: "The more complicated a device is, the less likely it is to work as planned, the more likely it will be to break down and the more difficult it will be to repair when it does." The Soviets, on the other hand, design their military equipment to be as simple as possible and thus it is reliable and can be built cheaply in large numbers. This, rather than high Soviet military spending, accounts for their superiority in *numbers* of tanks, artillery, submarines, and so on. If we are to redress the imbalance, it will be necessary to follow their example.

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Unions in academe

I was very interested in the letters on unions in academe (January 1984, page 11; June, page 11; October, page 11) because the subject sounds so surprisingly familiar, considering the large differences in faculty and union status and structure that exist between the US and Italy, where I work. Since this process started much earlier in Italy than in the US, I think that some American colleagues might be interested in knowing where the union road leads, and I anticipate that it leads just where they fear most.

The reasons for seeking stronger support in negotiations than individual efforts can provide are evident; the process is almost self-igniting—and that is how the unions were born. However, today the process, once started, not only proceeds almost automatically—and with little democratic input—but also implies general trends that are hard to modify and are perverse to the academic world, both in universities and research centers.

Collective action brings about uniform, low-profile goals that generally fit very well to the interests of the administrators—who consequently prefer dealing with unions over dealing with professional associations—but may be lethal for a community that is strongly based, to the contrary, on individual personalities. This trend toward uniformity tends to compare academic work with industrial or service jobs and ultimately tends to deny the special requirements of the former. That is lethal too, because most industrial jobs require interchangeability of personnel in each position, which is the antithesis of science—where staffwork merely means merging, not neutralizing, individualities.

Eventually unionism will involve sharing managerial responsibilities, because a job is not only a matter of salary but also a matter of environment. This, in large extent, can be understood for many jobs where economics tend to curb social issues, but may be fatal in the scientific world, as it will cross and easily interfere with and try to curb the administrative assault!

For these reasons, I think that today's unions are inflexible bodies; they are simply inappropriate in academe and, as with all wrong prescriptions, may serve to poison the patient they are intended to relieve.

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Several years ago, after leaving the Hawaii Institute of Geophysics, the University of Hawaii made it a requirement that full-time staff members there had to join the union. Apparently I got out in the nick of time. One of my colleagues, who was against unions, refused to join. He was subsequently relegated to a smaller office, permitted only to work part time, received progressively less support and eventually quit. If that's an example of what unionism does on campus, it is entirely inappropriate to academe.

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