

letters

art that depends on a disposition of spirit, a dedication and understanding of young people as well as knowledge of subject matter.

Would we suggest that a shortage of doctors be relieved by having biology majors put out their shingle and start practicing? In any other society, this would be just as foolish as saying anyone could walk into the classroom.

I am not denying that there are problems; nor am I aligning myself with the AFT or NEA. I am merely stating that such a suggestion probably reflects the crux of the whole problem. Few in our American society, including many teachers, consider teaching a profession in the highest sense of the word.

Finally, I would welcome any scientist from industry to become a resource person to help me in a myriad of ways, but please give me the courtesy to realize you could not do as well as I can in teaching from day to day, unless you have the disposition and the experience.

ANDREW CORDELL
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11/83

Hyperfine data in astrophysics

In his article, on atomic spectroscopy (November, page 52), James Wynne indicates in table 2 that solar physicists and astrophysicists are not in need of data on hyperfine splitting. Hyperfine patterns are actually quite important in the analysis of the chemical composition of the Sun and stars.

Only for very weak absorption lines does the line strength depend linearly on the column density of the absorbing species. As spectral absorption lines deepen, they saturate, and the line strength for saturated lines depends very significantly on the line width. The width, in turn, depends upon the thermal velocity of the atom producing the line, the small-scale turbulent velocity in the stellar atmosphere and any other source of line broadening (except radiation and collisional damping, which affect only strong lines). One of the few additional sources of broadening is hyperfine structure. The hyperfine effect spreads out the total transition probability in frequency, thereby preventing saturation until the line has become stronger.

While it was known for decades that certain lines in the Sun were broader than expected when one considers only the thermal and turbulent velocities, it was only in 1952 that H. A. Abt [*Astrophys. J.* 115, 199 (1952)] showed that hyperfine structure affected the

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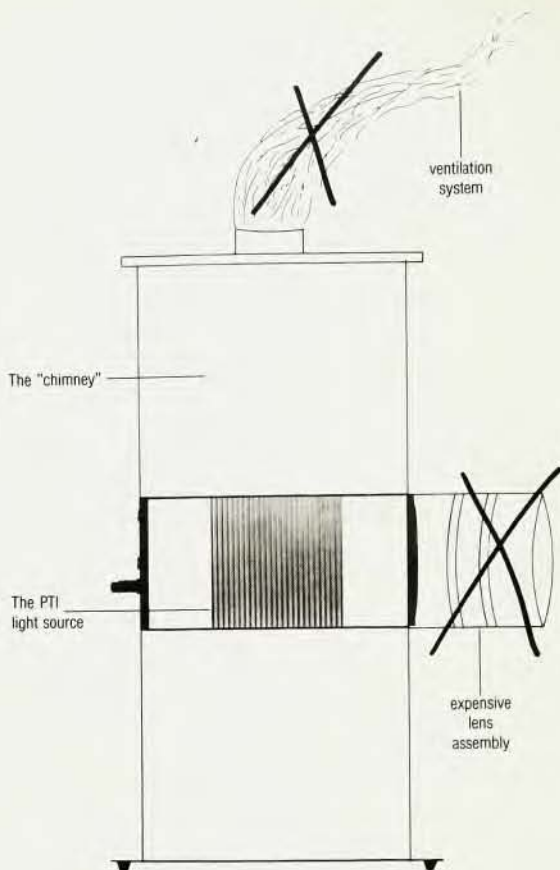


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letters

strength and breadth of solar lines. Since, then, astrophysicists have usually taken hyperfine broadening into account (when the patterns were known) in their analyses of solar and stellar spectra. Additional measurements of hyperfine patterns will be very welcome by the astrophysical community.

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11/83

Scientific freedom

There is currently much interest in impending governmental restrictions on and censorship of scientific communication. A central item, in this regard, is that of controlling access to "nuclear information." Statements from within the scientific community appear frequently, along with commission studies, on the grave danger of restricting the openness of scientific exchanges.

In a related area of concern, declarations from within the scientific community have been formulated on the prevention of nuclear war. In the preamble of a document presented to His Holiness, Pope John Paul II, it is noted that "Science can offer the world no real defense against the consequences of nuclear war. There is no prospect of making defenses sufficiently effective to protect cities..." The same document, formulated by an assembly of presidents of scientific academies as well as other prestigious scientists, makes the appeal:

► To national leaders, to take the initiative in seeking steps to reduce the risks of nuclear war, looking beyond narrow concerns for national advantage; and to reject military conflict as a means of resolving disputes.

► To scientists, to use their creativity for the betterment of human life, and to apply their ingenuity in exploring means of avoiding nuclear war and developing practical methods of arms control.

It is by now widely recognized by those responsible for the formulation of governmental policy as well as to those within the scientific community and, indeed, to the citizenship at large, that the nuclear weapons build-up is a destabilizing process. It is a blatant lesson of recent history—deployment of multiple-warhead ICBMs being a case in point. Hans Bethe, in responding to the new initiatives in weapons research, stated in March 1983 (page 120) that "It would be absolutely tragic if we were to jeopardize the intelligence satellites in any way. We have, therefore,