

is to generate, through individual interviews with applicants to US graduate schools in physics, reliable information on such applicants regarding their preparation and potential for graduate study. For further information contact M. J. Moravcsik (U. of Oregon) or M. Seadron (U. of Arizona).

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12/29/80

Nuclear insanity

Physicists have been intimately involved in the MX missile debate, as evidenced by the fact that there was a whole session devoted to this subject at the New York APS meeting. Although prior commitments prevented me from attending this session, I would still like to contribute to the debate.

I believe that considerable light can be shed on the question of the vulnerability of our deterrent system by solving a very simple problem in high-school mathematics. Suppose that the US has 10 000 warheads and the probability of the Russians knocking out any particular warhead in a single attack is 99%, what is the probability that the Russians will knock them all out? (Remember that if we have just a single nuclear warhead left, we can still wipe out Moscow.) The answer, of course, is $(.99)^{10\,000}$, which turns out to be 2×10^{-44} , a very small number indeed.

It is reasonable to assume that this number is not much greater than the probability of a person being struck on the head by a meteorite while walking down the street, and anyone would agree that a person who was obsessed by the fear of being struck by a meteorite, who refused to leave his house because of such fear and who squandered his life savings in attempting to protect himself against this particular catastrophe, is in direct need of psychiatric help. We can only conclude that any "military analyst" who applied the same type of reasoning to his private life that he applies to military problems might be faced with the very real danger of being institutionalized as a paranoid schizophrenic. In short, we can conclude that to anyone willing to exert the effort to use his common sense, the MX missile system is as unnecessary as it is unworkable.

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1/5/81

Laser-induced collisions

The otherwise thorough article by Zare and Bernstein on laser studies of

chemical reaction dynamics (November, page 43) leaves a misleading impression concerning the "infancy" of laser-induced collisional processes. The first reliable observation¹ of laser-induced energy transfer was reported over three years ago. Reports of Penning and associative ionization^{2,3} as well as charge transfer⁴ quickly followed. Recent polarization studies of dynamically correlated collisional redistribution of radiation⁵ broaden further the scope of observed laser-induced phenomena.

These more elementary collisional processes are indispensable for a solid understanding of reaction dynamics. Charge transfer, for example, is the essential characteristic of the celebrated "harpooning" mechanism. Laser-induced associative ionization involves chemical bond formation engendered by intense optical radiation between two free particles. Depolarization studies of dynamically correlated far-wing absorption directly probe two-body collisional interactions at "chemical" internuclear separations.

On the basis of these developments I would argue that laser-induced inelastic collisions, while far from maturity, have at least progressed from infancy to early childhood.

References

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1/9/81

More on boycott

Having just concluded my resignation from membership and fellowship in The American Physical Society, I ask a few column-inches to raise once again the subject of Council's boycott against states which have not ratified the Equal Rights Amendment. There are two disturbing dysfunctions in this affair which still deserve scrutiny.

Although PHYSICS TODAY spilled much ink over the matter, it was entirely after the fact. Council considered the issue for a year before it acted in November 1978, but made no attempt to use the Society's excellent organs of communication (PHYSICS TODAY, the Bulletin) to inform and consult the membership before taking this unpre-



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The plenary sessions will also include presentation of the 1981 Frederic Ives Medal Address by Georg Hass formerly of the U.S. Army Night Vision Laboratory, as well as presentation of the 1980 Frederic Ives Medal Address by Aden Meinel of the University of Arizona.

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letters

cedented and controversial step into politics. The PHYSICS TODAY staff may also be at fault. Presumably you regard yourselves as a news magazine, digging out information of interest to your readers, and not merely as a propaganda sheet.

The other breakdown here was the nugatory role of the Forum on Physics and Society. This issue is a perfect example of the kind of thing the Forum was created to handle, and the Forum's failure to promote full public discussion of this was a deep disappointment to those of use who have supported the Forum from its inception. The sole inkling of some impending action that a keen-eyed observer could glean was a single morally anemic missive in the Forum newsletter.¹ That author urged us to break existing hotel contracts and dare the hotels to sue us. If this is the exalted moral insight we physicists have to offer to society at large, perhaps we should stick to physics.

Overall the impression is of a star-chamber, establishment proceeding. Some of us, who object in conscience to the politicizing of American science and who have already spent much time and effort against it,² have now had to resign. Well, that's that.

References

1. P. J. Gollom, "Letter: The Equal Rights Amendment and the APS," *Physics and Society* 7, (No. 2), 1 (1978).
2. J. E. Felten, letter, *Astronomy Quarterly* 2, 107 (1978).

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1/14/81

Grand unified mass

A recent article on the unified theory of Elementary Particle Forces by Howard Georgi and Sheldon Glashow (September 1980, page 30) points out that the unification of strong, weak and electromagnetic interactions involves the appearance of particles having almost macroscopic masses of about a nanogram ($\sim 10^{14}$ GeV). Such superheavy particles seem to be an inevitable feature of most grand unified theories. Gravitation is still, however, left out of these various schemes.

I wish to report in this letter one interesting result of my humble efforts to arrive at a unified understanding of all the four fundamental interactions. This is the appearance of a quantity having the dimensions of mass and involving the coupling constants of all the four fundamental interactions.

It reads:

$$M = (\hbar^2/m_e)[\alpha_E \alpha_s (G_N G_F)^{-1/2}]$$