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5/3/78

Particle poetry

Sidney Drell's article "When is a Particle?" in June (page 23) inspired the following doggerel (with apologies to Gelett Burgess and René Descartes):

I've never seen a quark;
I've often hoped to see one.
But this I know and know full well,
Though we can't see,
We all agree:
NON VIDEMUS ERGO EST!

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Counterculture dialogue

Members of the countercultures have questioned the value of science and technology. Dialogue with them is often difficult. I suggest that we may promote needed dialogue about the values of science and technology by first focusing upon the contexts within which scientists' values are appropriate, and upon the contexts within which many of the counterculture values are appropriate.

Such a focus will help us all avoid inappropriate affirmations of values—affirmations that may appear arrogant to some. It is not helpful to affirm values outside the "range of their propriety"—any more than it is helpful to stick to Newtonian Mechanics in situations that call for Lorentz transformations, quantum mechanics, and/or warped-space equations. We will do a better job of teaching scientists' values and of helping the supporting public understand them if we take care to indicate the limited contexts in which our professional values are appropriate, and the other contexts within which they are inappropriate. Modesty wins friends. Apparent arrogance loses friends.

Scientists' professional values do not form a good basis for promoting dialogue with non-technical people; in fact, scientists' professional values often undermine dialogue. Before we can "sell science" we

must understand our audience on its own terms. We must develop a mutual understanding of the situations in which our values as scientists occasion conflict with (or are tangential to) the values that are central to the personal lives of the non-technical people who support us.

Technical studies will not help us transcend our technical preoccupations. The kinds of insight and understanding we need can come only through a transdisciplinary approach that involves equally both technically and nontechnically oriented people who are all primarily concerned with promoting two-way communication—that is, dialogue. I will be developing these and related ideas while on sabbatical this fall—and solicit communications from readers with similar interests and concerns.

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7/24/78

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Plutonium-free bomb

I very much appreciated the article "Nuclear power and nuclear-weapons proliferation" by Ernest J. Moniz and Thomas L. Neff that appeared in the April issue (page 42). Of all the information I acquired in perusing the article, the most astonishing is the discovery, based upon the figure on page 44, of the extreme potency of plutonium as a bomb material. For, it would appear, one could reduce the fissile content of plutonium to 0% and still produce a bomb with a critical mass of 20 kg—a plutonium-free plutonium bomb!

I checked the reference cited in the figure caption. Only the points with fissile content $\geq 50\%$ are cited there, together with the information that the non-fissile material is plutonium 240 and 242. Surely the curve must rise to infinite critical mass as the fissile content falls to zero? Or am I so out of touch with this subject as to believe that fissile materials are essential to a fission bomb?

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4/14/78

THE AUTHORS COMMENT: We regret any confusion caused some readers by the graph of critical mass versus fissile content shown in our article. As implied on page 42, "fissile content" refers to the isotopic fraction fissionable by thermal neutrons (the odd-mass isotopes of uranium and plutonium). However, the critical mass is that in a fast neutron spectrum, as produced by the fission process (see the box on page 51). Thermal neutrons, while clearly of great importance in reactors, cannot play an essential role in a nuclear weapon, because the monitoring time is too long to allow supercritical assembly.

Isotopes that are not thermally fissile

may contribute to a nuclear explosion if the threshold for fast neutron induced fission is sufficiently low and the corresponding cross section sufficiently high. This is not the case for U^{238} ; the fission threshold is about 1 MeV, leading to a neutron multiplication factor of about one half. On the other hand, all the plutonium isotopes have low fission thresholds, substantial fission cross sections, and therefore fairly small critical masses. Indeed, the prompt critical mass for a sphere of Pu^{240} is smaller than that for weapons-grade uranium!

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5/11/78
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More oppressed physicists

We were comforted to see the Guest Comment about oppressed physicists by Bernard Cooper and John Parmentola in August (page 9). It may be useful to point out that their lists of oppressed physicists are not exhaustive. In particular, for the case of Argentina, in which we have been involved through the "Comité pour la Liberation des Physiciens Argentins Emprisonnés"¹ and the American Association for the Advancement of Science,² we know of the following additional physicists:

Missing or imprisoned:

A. Calvo
R. D. Chidichimo
H. D'Olive

Killed:

M. Tarchinsky

We would like to report that E. Sevilla has been released and is now in the US.

We feel it is also pertinent to remember that there are many additional Argentinian physicists who have been fired from their positions and are still looking for work either at home or abroad.

References

1. C. D. Dominicis is a founding member of "Comite pour la Liberation des Physiciens Argentins Emprisonnes," chaired by A. Kastler. For information or a copy of the committee bulletin, write to Pierie Moussa DPHT CENS BP2 91190 Gif Sur Yvette, France. See also letter to PHYSICS TODAY February 1977, page 15.
2. J. P. Primack is a member of the AAAS Committee on Scientific Freedom and Responsibility, which has established a Clearinghouse on Persecuted Foreign Scientists. For more information, including a detailed report on scientific freedom in Argentina, contact the Human Rights Coordinator, AAAS, 1515 Massachusetts Ave. NW, Washington, D.C. 20005.

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