

SUPERCool

Thermoelectric PMT Chamber

AT LEAST 60°C COOLER

cathode operating temperature is provided by this new, water-cooled PMT housing. Temperature stability is $\pm 0.05^\circ\text{C}$. No bulky compressor means high reliability. Model TE-210 TSRF end-window tubes (and side-window version) provide fully wired socket assembly for all standard PMTs. Also — Front Mounting Adapter and 19" Relay Rack Controller. It accepts options offered for all standard PFR chambers.

Call (617) 774-3250
or write:



Ask about our new
21-pin Ceramic Socket for
cooling to dry ice temperatures.



Products for Research, Inc.
88 Holten Street, Danvers, MA 01923
CABLE: PHOTOCOOL TELEX 94-0287

Circle number 98 on Reader Service Card

Custom Thin Film Deposition

A service and research laboratory specializing in the deposition of electronic, optical, decorative, and tribological coatings. Support facilities include SEM and AES.

For your *thin film*

Research,
Development, and
Production,

please call:

Midwest
Thin Films

5510 West Florist Avenue
Milwaukee, WI 53218
(414) 527-2260

A division of
Midwest Research Microscopy, Inc.

Circle number 99 on Reader Service Card

letters

and standoff distances to the off-site public. This composition is not a source term and does not correspond to the expected releases from a severe accident. Indeed the assessments that are made assume that only off-site releases, or source terms, that occur are from low-leakage paths and do not result in major health impacts. Most regulations require nuclear power plants to be designed, built and operated in such a way as to prevent releases and to retain any release that might occur, and the quoted composition is used to enforce those regulations. A severe accident is an event that surpasses the required capabilities of the plant.

Levi also cited the large "dose-conversion" factors of the refractory fission products, typified by lanthanum, as the reason the APS study group devoted especial attention to their potential release. This is not true, as the dose-conversion factors (the ionization densities in human tissue per curie of isotope) of the refractory elements are no larger than those of other fission products and much smaller than some iodine and strontium isotopes. The refractory elements deserve consideration simply because there is so much of them in the core inventory. As used in severe accident studies, the "lanthanum group" of refractory elements includes all elements having very stable refractory oxides, and 0.1% of this group is a much larger fraction of the mass and radioactivity of the core than 4% of the iodine. In addition, it is the dose received by the human thyroid gland as a result of inhaling and absorbing iodine that is of relative importance, and not the whole-body dose that was compared in Levi's excerpt.

Doses from noble-gas fission products can be received only from radiation emitted in the surrounding air, while the refractory oxides can deliver radiation from deposited aerosol particles inside and outside the body long after gaseous releases have diffused or blown away.

JACQUES B. READ

US Nuclear Regulatory Commission

L. G. HULMAN

Accident Evaluation Branch

8/85 US Nuclear Regulatory Commission

Conceptual understanding

Lillian C. McDermott has considered some important problems in her article, "Research on conceptual understanding in mechanics" (July 1984, page 24).

I have argued (November 1983, page 111) that high-school pupils know neither Aristotle nor Newton but sim-

ply have the tendency to establish the relationship between the cause and effect. So the persistence of Aristotelian thinking is natural.

In case of the swinging pendulum, perceiving a force in the direction of motion is not surprising. On the contrary, it is consistent with our assumption that the unbalanced sine component of the weight (that is, $mg\sin\theta$) acts as the restoring force.

D. V. SATHE

Dadawala Junior College
Pune, India

1/85

'Physics News in 1984'

In his item, "Reconnection of Magnetic Field Lines," in "Physics News in 1984" (January, page S-50), N. C. Luhmann claims that "associated with the reconnection in both solar flares and magnetic substorms is a transfer of magnetic field energy into heating and directed particle energy."

This should be compared with the statement in a monograph authored¹ by Larry R. Lyons and Donald J. Williams: "It remains to be shown that field line interconnection can directly transfer energy from the magnetic field to charged particles (field line merging, reconnection) or that plasma turbulence effects are important as acceleration processes."

In my judgment, the Lyons and Williams version is the correct one. They could have safely added that this will never be shown because it is in conflict with elementary laws of physics. This is easily understood if we calculate the electric current (by taking the curl of the merging magnetic field) and depict the current system. This demonstrates that the transfer of field energy to the acceleration of particles is not a *local* process (except in special cases) but a *global* phenomenon, which makes it necessary to include the whole region where the current flows. (I have treated² this subject in my monograph *Cosmic Plasma* and in a number of papers.)

References

1. L. R. Lyons, D. J. Williams, *Quantitative Aspects of Magnetospheric Physics*, Reidel, Dordrecht, Holland (1984), p. 4.
2. H. Alfvén, *Cosmic Plasma*, Reidel, Dordrecht, Holland (1981).

H. ALFVÉN

University of California
San Diego, California

3/85

THE AUTHOR REPLIES: The basis for Alfvén's disagreement with my article describing the elegant pioneering basic laboratory studies of R. L. Stenzel and W. Gekelman on magnetic field line reconnection processes appears to be based solely on the sentence that he