engage in the conduct or administration of classified research and the other recommending that universities should not engage in research and development of weapons or "devices designed to destroy human life or incapacitate human beings" nor should they "directly or indirectly take part in military operations or participate in the collection of military intelligence." Both of these statements were prefaced by "except in times of national emergency."

While we do not feel compelled to define emergency in detail, one might assume that if a situation becomes so dire that such measures as price and wage control, excess profits taxes, job freeze and mobilization of industry and manpower are justified, a relaxation of our guidelines might also be justified.

University scientists and universities are hardly twiddling their thumbs waiting for an emergency to confront them. They are constantly confronted with an emergency—the education of increasing numbers of young men and women and continual modernization of that education to meet the needs of society.

CAMERON B. SATTERTHWAITE
Chairman,
Federation of American Scientists

A question of credit

I feel obliged to compliment Hershel Markovitz for his extremely interesting historical documentation in "The Emergence of Rheology" (PHYSICS TODAY, April, page 23) and to respond to one point regarding the treatment of tube-flow data. Markovitz suggests that a derivation attributed to Karl Weissenberg finally made it possible to extract the invariant shear-stress–shear-rate relation for a rheologically complex fluid without invoking arbitrarily defined rheological models.

Presumably the following Poiseuille flow functions are the basis for these remarks

$$\frac{Q}{\pi R^3} \equiv F(\tau_w) = \frac{1}{\tau_w^3}\int_0^{\tau_w} \tau^2 f(\tau)\,d\tau \quad (1)$$

$$f(\tau_w) = 3F(\tau_w) + \tau_w \frac{dF(\tau_w)}{d\tau_w} \quad (2)$$

Here Q, R, and τ_w denote, respectively, flow rate, capillary radius and wall-shear stress, and $f(\tau)$ is the invariant rheological function relating shear stress and rate of shear.

We cannot agree with the implication that Weissenberg alone should be entitled to the credit for this significant development. According to the literature, equivalent forms of these expressions, *together with complete derivations*, appear in a classic paper written by R. Eisenschitz, B. Rabinowitsch, and Weissenberg (*Mitt d. deutsch. materialprufunganstalt*, **9**, 91, 1929). In their discussion, the authors emphasize that for a given fluid the dependence of Q on the pressure gradient and radius must be represented by a single function $F(\tau_w)$ if equation 2 is valid. Subsequent to this reference, these expressions are cited by Rabinowitsch (Z. Physik. Chem., **A145**, 1, 1929). He remarks that the underlying theory was presented by Herzog and Weissenberg at a meeting of the Colloid Society in Hamburg, 21 Sept. 1928 and reported in Kolloid-Z., **46**, 277, 1928).

Obviously, several *collaborators* were actively concerned with the problem of finding the unknown function $f(\tau)$ for colloidal solutions, described as "elastic fluids." It is indeed curious, and perhaps ironic in view of Markovitz's credit to Weissenberg, that this particular treatment of tube-flow data is also frequently credited in earlier rheological literature to either Rabinowitsch or Mooney.

J. G. SAVINS
Mobil Development and Research Corp.

THE AUTHOR REPLIES: Savins is certainly correct in calling attention to the confusion concerning the origin of the formula for calculation of the viscosity or shear–stress function from tube-flow data. I cited only Weissenberg because both Rabinowitsch and Eisenschitz individually, in papers where they were the sole authors, state unambiguously that Weissenberg derived the equation (B. Rabinowitsch, *Z. Physik. Chem.* **A145**, 1 (1929), footnote on page 18, and R. Eisenschitz, *Kolloid-Z.* **64**, 184 (1933), p. 187. The latter paper also gives further historical details.)

There is an error in my paper that I would like to correct. B. D. Coleman has called my attention to the fact that "Young's modulus" was actually clearly and accurately introduced by Leonard Euler in 1727. See, for example, Clifford Truesdell, *Archive for History of Exact Sciences* **1**, 3, 1960, or G.A.E. Oravas in his Introduction to Carlo Castiagliano's *The Theory of Equilib-*

makes pulse height analysis simple, accurate, inexpensive

The 400-channel Victoreen PIP PHA fills the void between the "cheap" but really costly instrument that's too limited in its capabilities . . . and the large, expensive system that's way beyond your immediate or future needs or budget.

PIP is the ideal complete analysis system whether you teach at the undergraduate or graduate level . . . or if you are engaged in sophisticated research. For example, PIP can fill the bill as a multiscaler . . . can perform single or multichannel analysis . . . can be used in Mössbauer studies or similar research.

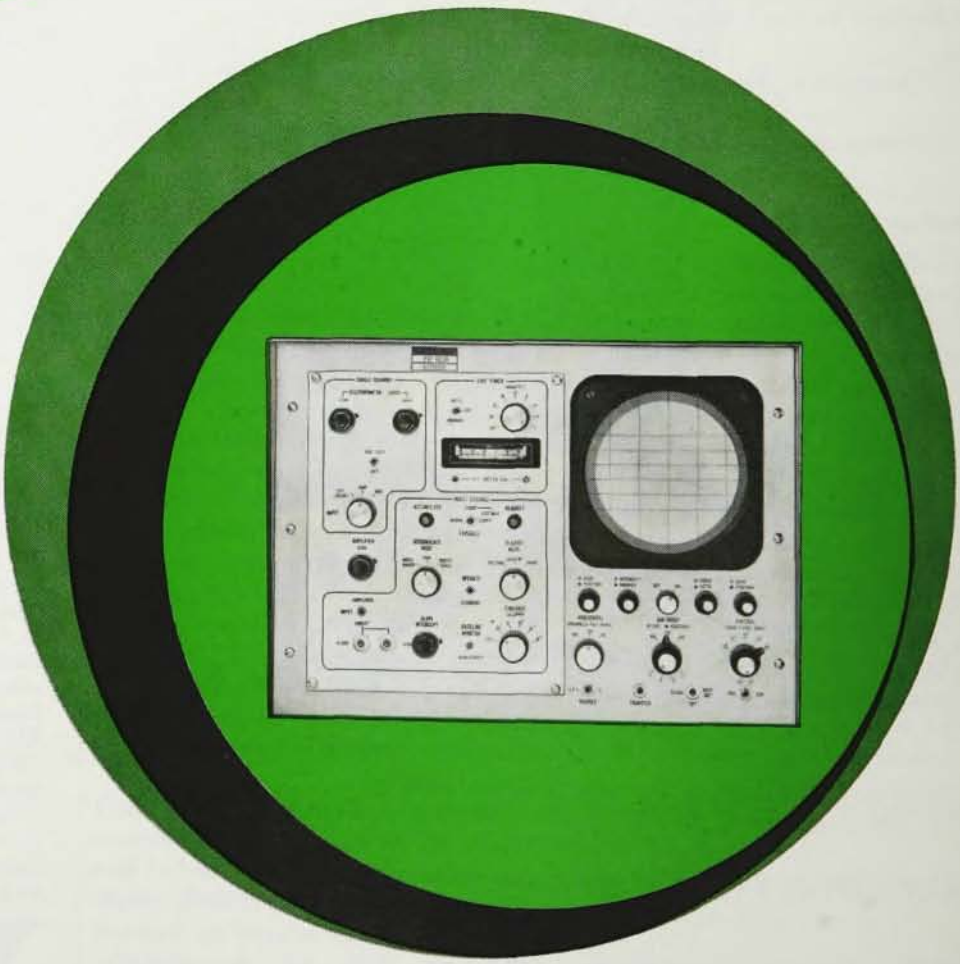
Don't shortchange yourself on necessary features. Don't go overboard on price. Specify Victoreen PIP pulse height analyzer systems — priced only slightly higher than many Spartan stripped instruments

VICTOREEN

PIP

Condensed Specifications

400 Channels (10^6-1 BCD/channel) ● All silicon semiconductors ● Four memory subgroups ● ADC full scale conversion switch selected: 400, 200, 100 channels ● Digitizing clock rate 4 MHz ● Integral linearity: 0.5% for top 98% ● Differential linearity: ±2% for top 97% ● Coincidence/anti-coincidence mode ● Built-in amplifier and single channel analyzer, preamp included ● Built-in 5″ CRT display ● Compact and portable.



Digital Products Group
VICTOREEN INSTRUMENT DIVISION
10101 WOODLAND AVENUE · CLEVELAND, OHIO 44104
IN EUROPE: GROVE HOUSE, LONDON RD., ISLEWORTH, MIDDLESEX, ENGLAND

VICTOREEN

A-1875

rium of Elastic Systems and Its Applications, Dover (1966).

HERSHEL MARKOVITZ
Carnegie-Mellon University

Wrong accelerator

In your May 20th-anniversary issue of PHYSICS TODAY one minor perturbation attracted my attention. In D. Allan Bromley's summary of progress in nuclear physics, the illustration on page 33 obviously is not Chalk River's 3.5-MeV Van de Graaff. Rather, it has the appearance of an air-insulated Cockcroft–Walton set.

As a collector of accelerator illustrations, I would be interested in knowing which C–W set is depicted.

E. ALFRED BURRILL
High Voltage Engineering Corporation

One small problem—the caption of the accelerator picture in my article was mixed up and is that appropriate to a picture you didn't use. The actual figure is of the NRC Ottawa 600-kV Cockcroft–Walton accelerator that ceased operation in 1948—not of the Chalk River 3.5-MeV Van de Graaff.

D. ALLAN BROMLEY
Yale University

Finding Oppie's hat

Harry Barton's account in your 20th-anniversary issue of my part in getting PHYSICS TODAY started was so warm and flattering that I hate to correct the record. But credit for finding the cover photo of Oppie's Hat Rampant on a Field of Cyclotron Plumbing belongs to Miriam White, who was with us for a short while in the first days of the magazine. She knew of it and of its aptness and got hold of a copy.

As it symbolized Physics Today then, it symbolizes Physics Then today.

DAVID A. KATCHER
Arthur D. Little, Inc

Rare-earth shapes

I do not wish in any way to detract from the merits of the Berkeley group on the shapes of the rare-earth nuclei which you describe in the March "Search and Discovery."

However, in all fairness, it should be mentioned that the existence of higher moments in the nuclear shapes has