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3. G. Poste, J. Doll, I. Fidler, *Proc. Natl. Acad. Sci. U.S.A.* **78**, 6226 (1981); R. Hill and V. Ling, *Cancer Res.* **41**, 1368 (1981).

Physics Nobel Prize

There is one shortcoming in the otherwise beautifully composed article by Philip W. Anderson (19 Nov., p. 763) on the 1982 Nobel Prize in Physics. Anderson writes: "Experimental observations of singular behavior at critical points (such as deviations of critical fluctuations or 'critical opalescence' from the naïve Ornstein-Zernicke [sic] form predicted in the 1930's) multiplied as the years went on."

Ornstein and Zernike actually developed their prescient theory of correlated density fluctuations as early as 1914 (*1*). They intended to correct a major problem with the (naïve?) Einstein-Smoluchowski treatment of critical opalescence, which led to a diverging, angle-independent scattering intensity at the critical point. Ornstein and Zernike demonstrated that near a critical point density fluctuations in adjacent volume elements become correlated; this, in turn, leads to a decrease in scattering intensity as the scattering angle increases from 0° to 180°.

The physical picture behind the Ornstein-Zernike scattering equation is that, although all density fluctuations become more likely as the critical point is approached, only the long-wavelength ones, responsible for the forward scattering, can grow without bound; the shorter wavelength fluctuations carry an extra cost in free energy proportional to the square of the density gradient. The concept that a density inhomogeneity bears a free energy cost proportional to the square of the density gradient was introduced by van der Waals in 1893 in his theory of surface tension (*2*); the employment (albeit implicit) of the same device in the description of supercritical density fluctuations is a demonstration of genius at work. The theory of Ornstein and Zernike has been so successful that, unlike van der Waals' mean field theory, it has survived until the present day as the correct representation of critical light scattering at low angles. It is embedded in the so-called Landau-Ginzburg-Wilson Hamiltonian, which is, after all, just the limiting critical mean field free energy density as given by van der Waals with the square gradient term added. Although the results for the structure factor as derived from the renormalization-group theory applied to the Landau-Ginzburg-Wilson Hamiltonian differ essentially from the original results of Ornstein and Zernike for fluids, it is by such a minute amount that no more than the *sign* of the departure has been established by the best light-scattering experiments available.

Thus the sentence quoted suffers from two defects:

1) The usage of the word "naïve" does not do justice to the fundamental role of the Ornstein-Zernike theory in the renormalization group approach; and

2) The "[e]xperimental observations of singular behavior at critical points" that "multiplied as the years went on" did not include definitive observations of departures from Ornstein-Zernike scattering.

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In Anderson's penetrating review of the scientific contributions of Kenneth G. Wilson which led to his 1982 Nobel Prize in Physics, there are two errors in a footnote on page 764 that I would like to correct. First, he attributes the introduction of the concept of the so-called renormalization group in quantum field theory to Gell-Mann and Goldberger. The Gell-Mann part is correct; but the Goldberger is not, unfortunately, as I wish I had been involved in this profound work. Gell-Mann's collaborator was Francis E. Low. The second error is the statement that the technique was developed to analyze the infrared (low frequency) divergence in quantum electrodynamics: in fact, it was used to study the ultraviolet (high frequency) divergence behavior of the theory.

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Information Technology

With regard to Philip H. Abelson's thoughtful editorial "Leadership in computer technology" (7 Jan., p. 11), let me add my concern in the more general area of information technology. Both Germany and Japan have national information policies and goals. The United States, on the other hand, has neither a policy nor a single government institution dedicated to advancing information technology per se. Foreign investments in information technology are in great evidence. In the area of optical disk technology for mass storage of computer data, Phillips–Eindhoven (Holland), Phillips–North America (Holland), Toshiba (Japan), and Thompson CSF (France) are some of the main contenders.

In the area of optical video disks, which offer much to information technology for both graphics as well as for the "publication" of digital data or information, the real strength lies in Japan, Holland, and France. It is interesting to note that, not only is there an obviously large share of the home entertainment market, including video disk and audio disk technology, going to Japan, but the once-American firms of Magnavox and Sylvania are now owned by Phillips (Holland).

In another area, two information enterprises founded in the United States, Bibliographic Retrieval Services (BRS) and Predicasts, are now owned by interests in Holland. BRS is one of the three largest general on-line information retrieval services in the United States. Predicasts supports and provides on-line access to the largest private (nongovernment) database on business products and activities in the world.

There are numerous other examples, but the general picture should be clear—if not obvious. We have good reason to be concerned about losing our lead, not only in computer science but also in applied information technology and services. Without more resolve and dedication on our part to do those things that have to be done on a national scale—planning, research and development, education, innovative applications, and cooperative programs—we stand to lose not only the lead but our ability to compete as a nation. We need to move from concern to action, and quickly.

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Correction

The AAAS Annual Meeting will be held in Detroit on 26–31 May 1983. The inclusive dates were given incorrectly as 21–31 May in the heading of the Preliminary Program (25 Feb., p. 948). The large body of water shown to the south of Detroit on the cover of the issue of 25 February is Lake Erie. The cover legend stated incorrectly that it was Lake Huron.