complete physics."

Holcomb, Resnick and Rigden did not also point out that whenever a completely new idea is presented in the development of physics, it is at first usually rejected, or, if accepted with reservations, it is usually ignored for very long periods. Rather than cite early developments of Galileo's or Newton's, say, it might be more appropriate to mention an example from the past three decades. The Opinion column pointed out that a very large number of key ideas must be screened in developing introductory courses in physics, so that many important and inherently fascinating classical topics are among those that are omitted. It also indicated that during the period 1956–60, some of the best physicists in the US gathered to agree on "the basis for a new tradition in introductory physics teaching."

The juxtaposition in one issue of the comments by Miller, Albert E. Moyer's review of the Michelson–Morley achievements (page 50), the Opinion column and the letters from Viktor K. Decyk (page 132) and H. Aspden (page 136) led me to believe (and hope) that there might have been a mention of some early theoretical research carried out at the California Institute of Technology by Hsun-Tiao Yang[1] and Lester Lees[1,2] and further developed by Harold Grad[3] in a review article published in the *Handbuch der Physik* that was devoted to the kinetic theory of gases and the solutions of the Maxwell–Boltzmann equation in the very large mean-free-path limit. The focus of the research by Yang and Lees was on the properties of classical fluid fields when the mean free path characterizing the field is very much greater than any dimension characterizing the bodies in the field. Yang and Lees demonstrated that the character of the small-disturbance phenomena undergoes a fundamental change under these conditions, in that a shear or transverse small-disturbance propagation mode emerges accompanied by a damping of the longitudinal mode that characterizes the Navier–Stokes flow regime.

Lees, who recently passed away, was considered one of the really creative scientists in modern gas dynamics and was world renowned for a series of important contributions. In his investigations of rarefied-gas phenomena, by applying the theory to the impulsive motion in its own plane of a planar solid surface in contact with a fluid, he found that transverse waves could exist in the field.

Textbooks that discuss wave propagation phenomena (for example, reference 4) generally omit any discussion of the existence of an idealized classical particle domain (the Knudsen domain) that is characterized by the appearance of a plane-wave transverse disturbance propagation mode. Therefore they fail to demonstrate the ability to model plane-wave propagation phenomena described by the Maxwell relations for a vacuum field.[5] The wave equation describing the propagation of transverse disturbances in the vacuum field is identical in form with the corresponding relation for the Knudsen domain: Both are characterized by a constant speed of propagation in a domain when the energy of the domain is a constant.

It is of interest that Earle H. Kennard[6] presents the demonstration of the invariance of the speed that characterizes Knudsen plane-wave propagation as a simple problem; that is, the invariance results from the condition that the presence of a shear disturbance component does not alter the speed calculated for a plane motion in a normal direction. Kennard points out that a speed of propagation results that was first suggested by Newton, namely, the ratio of the constant pressure in the domain to the constant density. In the idealized description of the small-disturbance phenomena in the domain, the normal and shear small-disturbance phenomena can be shown to be independent, and it is the idealized Knudsen domain properties that are of interest.

The initial objective of the investigations of rarefied-gas flow was to clarify the physical foundations and improve the understanding of the transition from conventional fluid dynamics to molecular kinetics. The early work by Yang and Lees suggests the potential for developing a bridge to improve the understanding of phenomena that can be described by similar relations characterizing a classical particle field and the electromagnetic field.

Astute students will immmediately recognize that if the Maxwell relations for the propagation of transverse disturbances can be duplicated, invariance conditions should also apply to the Knudsen phenomena.[7] The more astute will also suggest that an alternative to the Lorentz assumption might be that the relations describing the transverse plane-wave propagation phenomena are invariant under Galilean transformations.[7] Astute students might also suggest that the analytical description of the more general small-disturbance phenomena characterizing the Knudsen domain could yield the first exact parallel of the Maxwell relations for a vacuum field with sources.

Including the description of the idealized classical Knudsen phenomena, especially the unique shear or transverse propagation phenomena that model plane-wave propagation phenomena in the electromagnetic field, in undergraduate as well as graduate texts could be a significant contribution to the education of students of physics and engineering.

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Register Physicists, Not Abstracts

In discussing the nonpayment of APS registration fees (see the February 1987 APS *Bulletin*, page 127, and Alexander A. Berezin's letter in PHYSICS TODAY, November 1987, page 129), one must bear in mind that APS members come from varying economic circumstances. At one extreme are individuals from rich, prestigious institutions who have multimillion-dollar research grants or contracts. As all their meeting expenses are paid by the institution or the grant, payment of the registration fee represents no sacrifice at all.

At the other extreme is the physicist from a small liberal arts college that is struggling to survive. His salary is likely to be modest and he is likely to have no grant or contract. His institution may not be able to support his research or his travel expenses. It may be understandable, if not forgivable, that he might be tempted to "cheat" on payment of his registration fees. While I agree that "badge guards" or other measures to enforce payment of registration fees may be reluctantly undertaken to protect the financial integrity of the APS, an accompanying attitude of moral indignation against "cheaters"

is really uncalled for.

I regard Berezin's suggestion that a registration fee be charged for submitting abstracts to the APS *Bulletin* to be particularly insidious. The bulletin is unique in that any APS member can get any abstract published, as long as it is neither libelous nor obscene. It provides an outlet for "cranks" and "crackpots" to express their views, which provides some comic relief and is an important safety valve. I must admit to occasionally using the bulletin myself, when I want to make some outrageously snide remarks about the Superconducting Super Collider.

If forced to pay a registration fee with each abstract, I would simply stop submitting abstracts. I suspect that many "cranks" and "crackpots" would stop submitting abstracts as well. I feel that this would be a significant loss to the bulletin and to the physics community.

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Corrections

August, part 2—The PHYSICS TODAY *Fifth Annual Buyers' Guide* was inadvertently published without a cover description. The cover shows Victor Huang, a freshman engineering student at Columbia University, with an XSAM 800 monochromatic x-ray pho-

toelectron spectrometer made by Kratos Analytical of Ramsey, New Jersey. The photo was taken at the microelectronics sciences lab of Chienfan Yu at Columbia. The photographer was Bruce Frisch.

July, page 40—The man at right in the photo is William Watson, not William W. Smith. ■