extraordinary power of the Gibbs viewpoint became apparent only after quantum theory was formulated. The canonical example is the Fermi–Dirac distribution, which can be derived from first principles in a few equations, without fog. I give the references below[1] not because they are particularly original, but for the convenience of readers who remember, for example, the incredibly complex apparatus of the Darwin–Fowler method and wish to compare it with an exposition of the Gibbs method applied to the Fermi–Dirac problem.

### Reference


1. C. Kittel, *Introduction to Solid State Physics*, 6th edition, Wiley, New York (1986), pp. 616–618. C. Kittel, H. Kroemer, *Thermal Physics*, 2nd edition, Freeman, New York (1980), pp. 1–4.



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MANDELBROT REPLIES: I have no love for Darwin–Fowler, and no quarrel with Gibbs—even when I'm at IBM.


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## Should SSC Have Overseers Overseas?

Just a decade ago, the US General Accounting Office invited this lone low-energy physicist to take part in a roundtable discussion on the future of high-energy accelerators. The tenor of the discussions was cordial enough until the subject came up of future machines of very large size, and the methods by which they would be managed and funded.

It seemed obvious that eventually the problem that would be faced would be the same one that faced our European colleagues in the 1950s and forced them to combine forces in CERN—namely the impracticality of a one-nation effort. This eventuality was not very congenial to the views of my colleagues, and when I pressed for the idea of international management and funding in the future, there was a decided chill around the table, and I found myself a minority of one. There were abundant expressions of approval for the idea of international cooperation, but none at all for international control. It was not difficult to infer that I was stepping on the very sensitive toes of people around the table who were directors of very large facilities and who did not relish the prospect that their successors might be answerable to an international board of directors.

As I have followed the debate on the SSC, and have questioned some of its key advocates on the question of joint international control of the SSC in the framework, perhaps, of a CERN–Pacific, I have detected the very same chill I felt in the GAO offices ten years ago. Despite the loftiness of the goals that invariably find expression in the SSC debate, some largely unspoken ambitions for personal power seem to be driving the project toward unilateral funding by American taxpayers and unilateral control by an American director. If there are good reasons for such unilateralism, now is the time for them to come out.


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## Builders of Weapons vs Builders of Minds

The alarming news story "Five Years After 'A Nation at Risk' US Schools Still Seek Better Grades" (June 1988, page 50) acknowledges the central problem: "The need for better teachers is inescapable." On page 72 of the same issue (from the report on AIP's 1986 employment survey) is the statement "[Physics] bachelors working for defense contractors had a median monthly salary of $2315, while those teaching earned $1350."

Any society that attaches nearly twice as much value to weapons as to the minds of its children deserves to have a problem (and I include Canada in this).


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## Asia's Academic Achievers

In the news story "Five Years After 'A Nation at Risk' US Schools Still Seek Better Grades" (June 1988, page 50), the graphs comparing US students with their counterparts in other countries are somewhat misleading. The European countries, for example, not to mention the Asian countries, have educational systems and philosophies different from ours. The comparisons with Hong Kong form-6 or form-7 students are especially misleading and unjustifiable. It defies my imagination to explain how Hong Kong students take a quantum leap from last place in 9th-grade science to first place in 12th-grade physics in three short years.

Form-6 and form-7 physics students in Hong Kong, as a rule, take calculus, calculus-based general physics

and chemistry to prepare for the University Matriculation Entrance Examinations. These courses are equivalent to freshman and sophomore courses in our universities and colleges. These students have had one year or more of general physics already in form 5. They certainly are *not* equivalent to high school seniors or 12th graders in the US!

Besides, they are, on the whole, older, averaging 19 or 20 years of age, and more mature than their American counterparts. Their socioeconomic system worships mathematics, chemistry, physics and engineering. Above all, their cultural and family influences are conducive to scientific perseverance and excellence.

There is no doubt that the gap is widening in physics aptitude between US high school seniors and their counterparts in Hong Kong. Our nation is still at risk! The gap, however, is neither as big and hopeless nor as spontaneous and abrupt as the graphs imply.

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## Rangefinder Caption Misses the Mark

In my article "How the Military Responded to the Laser" (October, page 36), the caption for figure 3, a photo of the AN-GVS-5 hand-held rangefinder, was inaccurate. The AN-GVS-5, unlike the tank laser rangefinder discussed in the text, was built not by Hughes, but by RCA, after it was developed by Richard J. Newton and his colleagues at the Army Electronics Command (Fort Monmouth, New Jersey). It was not operational until the 1980s, whereas tank laser rangefinders were fielded in the 1970s. I am grateful to Newton for calling this error to my attention.

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## Bitter Lab, Bitter Memories

I would like to clarify a point made in your news story about the Francis Bitter Magnet Laboratory (July 1988, page 61). Contrary to the impression one gets from your report, former members of the in-house research staff did not leave the lab because we feared competition for external funding. Indeed, all of us possessed Federal research support at the time of our departures and continue to com-