copy of Trower's letter, we received a communication from Pons to the effect that several thousand copies of the article were widely circulated in March and April; that the article appeared in the *Journal of Electroanalytical Chemistry* 17 days after the press release; that reprints of the article were widely distributed; that the experimental details, restricted as necessary in a Short Communication, are in the article; and that Pons and Martin Fleischmann have made full, expanded details available to all scientists who have requested them. As of press time, we have not received authorization from Pons to publish his communication.

For China's Students in the US, the Point of No Return

William Sweet's news story (June 1988, page 67) and the more recent anonymous letter (December 1988, page 15) concerning Chinese students in the US have made their situation crystal clear. From these pieces (especially the latter) the reader who is well informed about current political circumstances in China should be able to find a sensible answer to the often-asked question, With hundreds of Chinese students having graduated or currently graduating from US institutions, why are so few going back to China?

To some Chinese students like myself, the answer is simple and straightforward: The political environment in China has not changed in any fundamental way from what existed in the first 30 years of the revolution—intellectuals have been especially mistreated for their independent opinions continuously since 1949. As a result, the consequences of returning to China are grave. For those, both here in the US and back in China, who are outspoken and critical and whose ideology clashes with that which has been relentlessly imposed on the masses in China, real danger awaits upon return. This has happened, for example, to Wei Yang, a former biology student, who was arrested during his 1986 vacation in China and later sentenced to two years in prison. Those who are simply fond of Western culture, values and traditions are likely to be confronted by the next "Cultural Revolution." They too may be forced to make the difficult choice between an unabused body with a confined mind and an abused one with a free soul. These two groups may well represent more than 50% of the Chinese students in the US. In both cases, the return of these young scientists to China would involve a similar advent of misfortune. The difference is just a matter of "when": The time scale for the first group might range from one day to several months, while that for the second group could range from one year to a decade.

The point is that the suppression of political and personal freedom is continuing. Who should be asked to face this situation, which has been occurring in China ever since 1949, in which thousands of Chinese scientists have received "brain surgery," many of them never surviving to pursue independent and creative work? Clearly, many of the Chinese students in the US have recognized this potential negation of human spirit and resources that awaits their return. These Chinese students are determined to fight for their future and for their survival. Any mischief planned for them by the government is bound to meet with enormous resistance.

NAME WITHHELD BY REQUEST
University of California, Los Angeles
1/89

Clearing the Slate About Feynman's 'Last Blackboards'

I am submitting this letter to identify the equations and figures on one of Richard Feynman's "last blackboards," shown in the middle of page 88 of the February issue. Except for the blocked-off diagram at the lower left corner and the boxed statements at the top, the blackboard's contents come from the last discussion I held with Feynman, on the afternoon of 14 January 1988. He had kindly allowed me to present to him the new probability model on spin types I have obtained to solve the Bohm spin-$\frac{1}{2}$ case for the Einstein–Podolsky–Rosen "paradox" of quantum mechanics.

As Feynman sat in his big chair at the right end of the blackboard, I erased it, except for those portions mentioned above, and started writing from the center, toward the right. This part is exhibited virtually intact in the PHYSICS TODAY photo. Within a couple of minutes, as soon as I presented the one-particle integral equation solutions that lead to two new types of spin-$\frac{1}{2}$ particles and to the measuring tool's type-dependent measurement interaction, Feynman became intensely interested. With his

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eyes beaming, he walked to the blackboard and we continued working on the left part, which, after several intermediate erasures, was full at the end of the discussion. The photo shows that most of what we wrote on that half of the blackboard was later erased and replaced by two scattering-like drawings, which may or may not represent Feynman's later thinking on the spin problem. But his writing on the two-particle-type probability densities and the corresponding measuring tool densities, as well as his equation for g on the top right, is mostly still there. I had not named the two types and used subscripts I and II in the exhibited formulas. Feynman said to just call them A and B. His use of this notation can be seen above the left "scattering" drawing.

It is inappropriate for me to explain the new model of spin types here (it has been further disseminated and is to be published), except to mention that Feynman's two lectures in 1980 and 1982 at Caltech on using negative probabilities to understand the EPR paradox inspired me to work on this well-known fundamental problem. He had allowed me quite a few privileged discussions over the years, beginning in 1966 with my taking his advanced quantum mechanics course at Caltech, and including several occasions since 1980 on which I sought to specifically understand the EPR problem. But this last occasion was the only such opportunity I had in his last two years.

Knowing that he had been struggling with cancer, I found it a great inspiration to see his usual healthy clear and quick mind and high spirits during the discussion. He probed the key notion of independent reciprocal probability densities profoundly. He was very pleased with and encouraging of the new idea. He asked me to write it up and see him again as soon as possible. And he promised to think more about it. I immediately shared this inspiration with several colleagues. But I did not know, and only learned retrospectively from his secretary, Helen Tuck, that he was quite ill even then.

In about two weeks I wrote the draft up and brought it to his office. He was ill and not in. I left it with Mrs. Tuck. He never saw it.

Feynman's last blackboards speak of his generosity to others and his unceasing quest for scientific truth. What the great teacher taught, we will carry on.

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3/89

Lessons Feynman Taught Them—and US

Here is a footnote to David L. Goodstein's article "Richard P. Feynman, Teacher" (February, page 70). Goodstein mentions Feynman's informal course Physics X and notes that he cannot discuss its contents, as faculty were excluded.

I graduated from Caltech in 1962 with a BS in physics, and attended Physics X regularly for about two years. In a sense this was the best part of my undergraduate education.

In my time Physics X was conducted on Thursdays at 11:00 am because that was a reserved, class-free hour (in case a campus-wide meeting had to be called). Feynman began by asking whether anyone had an interesting physics problem. If someone did (and we spent lots of time trying to think up questions that could challenge him—I think that was one of his motivations) Feynman would work it out *before our eyes*. If no one had a good problem he always had one of his own. I have no idea whether Feynman cheated by thinking about his own questions before the lecture, or whether he attacked them as extemporaneously as he answered questions from the floor. I suspect the latter because he was always scrupulously honest.

Physics X let us students see how a great physicist thought. But imagine what breadth of knowledge and rapidity of analysis were necessary to put on such performances, week after week. I know of no other scientist crazy enough even to try such a thing, much less pull it off.

Two incidents, recalled here to the best of my ability, summarize the impact of Physics X on my career.

▷ Tommy Lauritsen, of lamented memory, taught a course in the physics of matter (atomic physics, solid state, plasmas, a little of everything). The exams were always closed book, an anomaly at Caltech in that era. Lauritsen believed in memorization, to the dismay of the students, including me. So when Robert Bacher (my adviser) asked how I liked the course, I complained about the memorization (which, according to student lore, was fit only for trolls—Caltech-ese for "nerds"—and organic chemists—but I repeat myself).

Bacher admonished me in the following terms: "A physicist has to know how big things are, so he has to know the physical constants by heart. He has to know, as naturally as breathing, the tools of his trade such as Maxwell's equations, the Schrödinger equation and so on. You have