memorials. Beyond a doubt some of these will be the sorts of things that Feynman himself would have found inappropriate. We would like to make a suggestion for a form of memorial project that an organization such as APS could easily undertake and that would have a lasting impact.

We suggest that all the extant videotapes of Feynman lecturing be gathered together, transcribed to a modern format and distributed. Surely many physicists and teachers would, like us, be delighted to have "The Character of Physical Law" and other classics available for our classes and for our own use. What better way to honor one of the greatest teachers of our time?

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6/88

Feynman's Dining Hall Dynamics

Richard Feynman's adventurous autobiography *"Surely You're Joking, Mr. Feynman!"* (Norton, New York, 1985) is one of the books I enjoyed most in recent years. In it is this story: "I was in the [Cornell] cafeteria and some guy, fooling around, throws a plate in the air. As the plate went up in the air I saw it wobble, and I noticed the red medallion of Cornell on the plate going around. It was pretty obvious to me that the medallion went around faster than the wobbling.... I started to figure out the motion of the rotating plate. I discovered that when the angle is very slight, the medallion rotates twice as fast as the wobble rate—two to one. It came out of a complicated equation!" He then tried to look at this in a more fundamental way. "I don't remember how I did it, but I ultimately worked out what the motion of the mass particles is, and how all the accelerations balance to make it come out two to one." He showed this to Hans Bethe, who remained unimpressed. But this eventually rekindled his love for "playing" with physics, and "the diagrams and the whole business that I got the Nobel Prize for came from that piddling around with the wobbling plate."

Great story, except for one little twist: A torque-free plate *wobbles* twice as fast as it *spins* when the wobble angle is slight. The ratio of spin to wobble rates is 1:2, not 2:1!

Being less adventurous, I can only present the reasoning in a conventional manner—through the principle of angular momentum conservation. There are a number of ways to do this.[1] The simplest is perhaps to solve Euler's equation for an axial-symmetric rigid body (a "top") in the body reference frame. Let the top's three principal moments of inertia be A, A and C, where $C \neq A$ so that rotation about the figure axis is stable and a wobble is possible. For small wobble angles, the solution to Euler's equation gives the wobble rate $\omega = f\Omega$, where $f \equiv (C - A)/A$ and Ω is the spin rate. The value of f is always between -1 and 1, approaching -1 for a slender cylinder (a "rod," for which $C = 0$) and 1 for a thin circular disk (a "plate," for which $C = 2A$). For a slightly oblate spheroid (such as the Earth or a neutron star), f is slightly larger than 0 and the wobble is very slow compared with the spin. In any case, we have $-\Omega \leq \omega \leq \Omega$.

But this is as seen from the body frame, which is rotating. In the inertial frame (where Feynman looks on as the Cornell plate goes up in the air) the wobble rate is $\omega_0 = \omega + \Omega$, so that $0 \leq \omega_0 \leq 2\Omega$. For a rod, $\omega_0 = 0$ (it does not wobble); for the Earth, ω_0 is slightly faster than one cycle every 24 hours. And for our plate, $\omega_0 = 2\Omega$: The spin-to-wobble ratio is 1:2.

"Surely You're Joking, Mr. Feynman!" has little to do with physics *per se*, and the above story is one of the few mentions in the book about specific physics. Whether the error is a mere slip in memory, or, in keeping with the spirit of the author and the book, another practical joke meant for those who do physics without experimenting, we do not know and perhaps never will. One thing is certain, though: This story appears on page 157 of the book and the text is 314 pages long; and we all know that the ratio of 157 to 314 is 1:2!

Reference

1. L. D. Landau, E. M. Lifshitz, *Mechanics*, 3rd ed., Pergamon, Oxford (1976).

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Inflation Reputation Reparation

In the first editions of my book *A Brief History of Time* (Bantam Books, New York, 1988 [reviewed in PHYSICS TODAY, November, page 115]) I stated that I had mentioned Andrei Linde's idea of a slow rolldown in the infla-

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tionary model of the early universe during a seminar I gave at Drexel University in Philadelphia in November 1981. Some people have interpreted this passage as implying that I am suggesting that Paul Steinhardt and Andreas Albrecht plagiarized Linde's proposal. This is definitely not the case. I have always been quite sure that Steinhardt and Albrecht came to the idea of a slow rolldown completely independently of Linde. And I have now seen a videotape of the seminar that, although not quite complete, does not show me mentioning Linde's idea. I have therefore had that passage removed from the more recent printings of the book. I am quite sure that the work of Steinhardt and Albrecht was independent of Linde's. I am very sorry if some people have gotten the wrong impression from what I wrote.

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12/88

The Different Circles of Solar Cycle Research

I read with interest the section on astrophysics in *Physics News in 1987*, and in particular the article by Herschel B. Snodgrass about the "Evidence for a Solar Cycle" (PHYSICS TODAY, January 1988, page S-11). Although I essentially agree with the point of view developed by Snodgrass, I feel annoyed by the references he cited. Not that these references are wrong or inadequate. But some of them are review papers, in particular the paper by Peter R. Wilson and his colleagues (number 1 in Snodgrass's reference list).

The "citation index" is often used in America, but also in France, to promote young scientists and to help their careers. But the people who will benefit from Snodgrass's article are the authors of his nine references, and this may be unfair to a large number of young scientists. Because many more review papers are written in English and published in American journals than are published in Europe by European authors (whether English speaking, French speaking or German speaking), the frequency of citation of articles by scientists outside the circle of the American authors of review papers will, on the whole, tend to be diminished.

In the particular case of the solar cycle, I would like to cite a recent review I have written for the *Irish Astronomical Journal*.[1] This review intends to put in their proper place many little-cited papers, many of which have priority over papers that are cited much more frequently, but not always with justification. Without mentioning any particular paper now (I refer the reader to my review), I would like to pay tribute to the very important work in this field by some French scientists: Michel Trellis, Jean-Louis Leroy and Jacques-Clair Noëns, concerning the coronal features; Paul Simon and Jean-Pierre Legrand, concerning the consequences for the solar cycle of geomagnetic and other observations; Elizabeth Ribes, André Mangeney and others, concerning the emergence of new active regions, and the evidence from such studies of a long migration period; and also the important recent discovery, by Zadig Mouradian, Irina Soru-Escaut and Marie-Josèphe Martres, of the so-called pivot points.

This list is not exhaustive, and American scientists often cite these papers in their original work. But they tend to disappear in review papers, where one is tempted to cite papers that already review most of the publications and that come from, let us say, the neighborhood.

I do not want to say that Snodgrass is unfair to these authors. But the "snowball system" by which review papers cite other reviews necessarily gives much less weight to original papers by scientists outside the American community, especially those who are not asked to give review papers. This, certainly, is unfair.

Reference

1. J.-C. Pecker, Irish Astron. J. **18**, 133 (1988).

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2/88

The article entitled "Evidence for a Solar Cycle" by Herschel Snodgrass, which was presented as a review of current ideas on the solar cycle, is essentially a summary of American research in this area, ignoring the substantial contributions made by French scientists. Regrettably, this biased approach appears all too often in the scientific literature and in fields of endeavor far removed from solar cycle research. This is a wider issue, however, and at present my concern is with the content of Snodgrass's article, to which I would like to add the main French contributions and place them in the context presented by Snodgrass.

▷ The concept of a 17-year solar cycle having two simultaneous branches of activity, a high-latitude band and a low-latitude band, was first suggested by Michel Trellis (1963) and by Jean-