served without violence to the muse by everywhere replacing the phrase "Rules One through Five" by the metrically equivalent "Lorentz's Rules."

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7/83

Negative impact of computers

Your May issue was dedicated to the role of computers in physics. It was a largely uncritical analysis of the great benefits brought to physics by the development of computers. I suppose that, by almost any standard, it was on the mark, although I wonder if with all the good there still isn't some bad. In 1960, when I was a student at the University of Notre Dame, a professor told me that he worried about the possible negative impact of computers on the development of physics. He feared that the computational power provided by computers would remove the impetus to develop better and more efficient theories. The editorial, "Needed: more computers in universities," by Kenneth Wilson stated, "First, basic theoretical science is moving away from analytically soluble model systems, such as the hydrogen atom, to problems of real-life complexity, such as the chemical bond, turbulence. ... Computer simulation is needed in all these subjects. ..." It is possible, after all, that "real-life complexity" only appears to be as such because no one has yet looked at it in the proper manner. Furthermore, because of today's computer-oriented environment, we may never discover that "simple way" of looking at "real life."

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6/83

THE AUTHOR REPLIES: Carl Adler has expressed the widespread fear that computer simulation will reduce the stimulus for analytic thought. To find out how computers will affect theoretical science, I suggest the study of a precedent. The development of experimental science, 400 years ago, has diverted numerous potential theorists into experiment, where they tinker with electronics or build equipment rather than concentrate on beautiful ideas about nature. However, experimental science has vastly increased the range and challenge of the armchair science, which in turn has attracted many fresh students to theory. I believe the increasing use of computer simulation in science will have exactly the same effect. The range of problems that are open to practical scientific inquiry will increase, the overall challenge of both theory and experiment will increase and, as a result, new recruits to theoretical and experimen-

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tal science will more than compensate for losses to computational science.

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7/83

Inflationary universe

The inflationary universe is in the news (May, page 17). Its tenets: In the beginning time ran fast and much was accomplished. This idea has been around a long time (see Genesis I). Also, "Others suggest that in those crowded, jostling yesterdays, the rhythm of events was faster than the rhythm of the spacious universe today; evolution then proceeded apace, and into the faint surviving traces, we now misread the evidence of a great antiquity. Our knowledge is too meager to estimate the value of such speculations, but they sound like special pleading, like forced solutions of the difficulty."[1]

I am sure many readers believe this unknown pleader has things backwards. Getting from 10 to 15 years old seemed interminable. From 65 to 70 years is frighteningly short. Hubble should be required reading for all young (and old) astronomers. It is good literature with fine style.

Reference

1. E. Hubble, *Observational Approach to Cosmology*, Oxford U. P. (1937) page 44.

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7/83

Chaotic computer?

More and more, the computer today is invading every part of the bureaucratic machinery. Paradoxically, all progress concerning computers—and this progress is immense—has the consequence of showing that this progress is never enough; one always needs something more powerful, faster, with more memory, smaller, cheaper, less energy-consuming, and so on.

The physicist Kenneth Wilson, who is very much in favor of the use of computers in theoretical physics, pointed out recently[1] that these machines are small toys "almost just capable to amuse children." The search for computational "power" is limitless and, as with pornography, it becomes more difficult to get pleasure. The big companies use all their imagination to gain a few kilobytes, complexify the systems and have faster machines. Tomorrow they should find a way to go faster than light! But these computers working at n times the "light speed" will still be