Bob Gale

No-gluinos!

OR 6/17/93

Atom Smasher Is Super Nonsense

By John Lukacs

PHOENIXVILLE, Pa.

"Boondoggle" is a relatively new American word. Originally a braided leather lanyard worn by Boy Scouts, in the 1930's it was applied by critics of the New Deal to "useless tasks performed by recipients of its doles."

The proposed supercollider in Texas, at $8.4 billion, may be one of the greatest boondoggles of all time. But the main problem concerns something more fundamental than cost.

The supercollider is a 53-mile circular tunnel that would accelerate atomic particles at supersonic speeds, smashing atoms into smaller and smaller bits. Many of its proponents tend to argue, among other things, that science may discover the smallest building block of the universe and that the universe can be explained by a Grand Unified Theory. Both assumptions are outdated.

The reduction of the universe to an essential basic particle was first attempted in the 5th century — theoretically, since he had no microscopes or atom-smashers at his disposal — by Democritus, who gave us the name and theory of the atom, establishing it as the basic unit of matter, a notion that has not changed for more than 2,000 years. Democritus was a materialist: He believed that the human soul itself consists of nothing but atoms. Plato did not believe a word of that.

We shouldn't, either. Consider only that Democritus thought the atom was absolutely indivisible. We know that this is not so: during this century (mostly because of equipment capable of "smashing" atoms) physicists have found that atoms include other, smaller particles.

But what is the essence of some of these particles? Are they — more exactly their tracks and patterns — not produced by the scientists themselves? This suggests a truth that we often ignore: that, just as nature came before man, man came before the science of nature. Thus the history of science — indeed; science itself — cannot be anything but the history of scientists. Especially when it comes to subatomic particles, we cannot speak of "nature" or of "matter" but only of situations that occur during and because of our observations of matter. It is impossible, as Werner Heisenberg proved with his Uncertainty Principle almost 70 years ago, to exclude the observer from what he observes.

Consider the names physicists have given to many of these particles — names that are often nothing but tortuous linguistic inventions. In his book "The End of Physics — the Myth of a Unified Theory," the physicist David Lindley (senior editor of the journal Science) writes that "the quality of nomenclature in particle physics [has sunk] to new lows." Well after physicists discovered the "neutrino" (to be distinguished from the "neutron") we now have "selectrons" and "sneutrinos" and, "worst of all, the whole set of quarks turns into a corresponding set of 'squarks.' Where the addition of an initial S doesn't work, diminutive endings have been resorted to, producing a 'photino' to go with the photon, 'gluinos' for gluons."

> Supercollider: medieval echoes for $8.4 billion.

It does not take much philosophical knowledge to recognize that we are, after more than 500 years, back in the presence of the medieval superstition of nominalism: the tendency to think that once we give a name to a phenomenon we've "got it." That is the very opposite of realism, which in philosophy, art and, indeed, in all intellectual endeavors began to replace nominalism around the time of the Renaissance.

But the assumption that the universe can be reduced to an original particle has already changed — or, rather, degenerated — into a second assumption, the myth of the Unified Theory. Many physicists are now inclined to believe that even if we cannot find the smallest building block of the universe, we can find a mathematical formula that will explain the entire universe: a Theory of Everything.

Given sufficient money (and, I assume, voltage) the supercollider may or may not "produce" the basic unit of the universe, while it will create more subatomic situations that may be formulated mathematically. But more and more mathematical formulas about subatomic matters consist only of untested and untestable assumptions, all of them theoretical and abstract. The belief that the universe is "written in the language of mathematics" is not only wrong, it is entirely outdated. "What is there exact in mathematics except its own exactitude?" Goethe wrote. He was right, as mathematicians in the 20th century have confirmed.

Near the end of the Middle Ages, a few theologians (the "scientists" of that time) persuaded a king of France to give them permission for an experiment that had been forbidden by the Roman Catholic Church. They were allowed to weigh the soul of a criminal by measuring him both before and after his hanging. As usually happens with academics, they came up with a definite result: the soul weighed about an ounce and a half.

We laugh at such things, of course. But remember how much suffering such coarse and foolish ideas about the soul produced in the wars of religion during the transition from the Middle Ages to the Modern Age — not to speak of the fact that the soul-weighing experiment was somewhat less costly than the supercollider.

We ought at least to consider the possibility that 100 or 200 years hence people may laugh at the pretensions of some of our scientists, as well as at our gullibility at the end of the 20th century.

We live at the end of a century, and probably at the end of an age, when the time has come to rethink not only some of the technical applications but the very meaning of "progress." To oppose the supercollider is by no means a reactionary position. To believe that the U.S. must not commit itself to such a financial and scientific boondoggle is a step forward, not backward.

My argument is not simply that it is not given to humans to explain everything, including the universe. When human beings recognize that they cannot create everything and cannot see everything and cannot define everything, such limitations do not impoverish but enrich the human mind. They mark the evolution of our consciousness.

Nearly 50 years ago, the French Catholic writer Georges Bernanos said that the atom bomb was "a triumph of technique over reason." Fifty years after us, rats may scurry through the 50 miles of tunnels under Texas hardpan and a few tourists may gape at the remnants of the supercollider, at the ruins of a monument to unreason. □

John Lukacs is author of "The End of the Twentieth Century and the End of the Modern Age."

Science Needs the Supercollider

To the Editor:

In "Atom Smasher Is Super Nonsense" (Op-Ed June 17), John Lukacs attacks not only the supercollider in Texas, but also the enterprise of particle physics. One can debate how scarce public funds should be spent on research, but this nonsensical article shows a shocking ignorance and a dangerous antiscience bias.

Mr. Lukacs argues that physicists are deluding themselves when they perform experiments because they create the situations that are being studied and therefore are inextricably part of the observation. If you boil water in a pot, you are creating a situation that would not exist if you did not turn on the gas. Does this prevent you from sticking a thermometer into the water and accurately measuring the temperature? Is the measurement meaningless?

Of course not, so Mr. Lukacs invokes the much-abused and ill-understood quantum uncertainty principle to inform the unwitting scientific community that physical law itself intertwines the observer with the observation. The uncertainty principle does tell us that it is impossible simultaneously to measure certain quantities. But in no way is quantum physics imprecise or muddleheaded.

Quantum physics is the basis of chemistry and solid-state physics, the cornerstone of the electronics revolution that has changed our lives. Medical tools such as X-rays and scans use elementary particles, which obey quantum laws, as probes. If Mr. Lukacs were to have a condition diagnosed by such a device, would he doubt the validity of the findings?

Particle physicists make up unusual and playful names for new particles. But these have nothing to do with the precise measurable properties that distinguish particles. It is because particles have quantifiable properties that the names are finally irrelevant. The argument that modern particle physics has returned to "the medieval superstitition of nominalism" is fatuous and cannot be used seriously against the supercollider.

Mr. Lukacs mockingly compares modern particle physics to an experiment conducted in the Middle Ages to ascertain how much a person's soul weighs by comparing his body weight before and after execution. This is gratuitous and insulting. Particle physics is a great intellectual triumph, and we should be proud of it. Theory and experiment are in excellent agreement, but much is unknown, and future experiment is crucial to making further progress. We should champion the struggle to know the workings of nature.

Mr. Lukacs offers no alternative to our "outmoded" methods of inquiry because he has none. Should we accept what he sees as limitations in our ability to understand the universe? Would he have offered this advice to Newton or Einstein? Would he have told Galileo "to consider the possibility that 100 or 200 years hence people may laugh at the pretensions of some of our scientists"?

The supercollider will open a new window on an energy range not yet explored by physicists. It must be built if progress is to proceed. Components of the supercollider are being constructed, tunnels are being dug, and young physicists like myself and

Christophe Vorlet

my colleagues are planning to explore the new scientific frontiers. It is in our country's best interest to complete this project, and I urge Congress to go along with the President and continue funds to assure us of a future in this fundamental area of science.

EDWARD FARHI
Professor of Physics, M.I.T.
Cambridge, Mass., June 18, 1993

How Mexican Jobs Ease U.S. Burden

To the Editor:

In "Reaganomics, With a Mexican Accent," (Op-Ed, June 11), Michael Lind accuses President Clinton of confusion because he supports revitalizing the economy and the North America Free Trade Agreement, but Mr. Lind's arguments are confused.

"For Mr. Clinton to try to raise middle-class incomes and taxes while Mexican and other third world immigrants are depressing wages and raising the costs of law enforcement, education and welfare would be like bailing water from a leaking canoe," he says correctly.

Yet we share a huge border with Mexico and have been unsuccessful in preventing illegal immigration for decades. Surely, the best way to cut Mexican immigration is to help Mexico provide jobs at home, and the trade agreement can only help.

It may be true that under the agreement we will lose jobs to Mexico, but we will lose those jobs anyway, to China, Malaysia and Thailand. The job loss will only accelerate, whether to Mexico or Asia, if we raise the minimum wage. We will almost certainly lose fewer jobs if the trade agreement passes. It will make much more sense for a Mexican factory to get bulky raw and intermediate materials from the United States than it would for a factory in distant Thailand. Also, new jobs will be created.

Remember, there was never anything to keep American companies from building factories in Mexico to export to the United States and elsewhere. The barriers were against American companies making goods for Mexicans on either side of the border. Since the Salinas Government changed policies, United States-Mexican trade has increased, and the United States has developed a significant and growing trade surplus with Mexico, preserving some United States jobs and creating new jobs on both sides of the border. The Mexican standard of living has increased in the process.

I share Mr. Lind's concern for American workers, but surely we must care for the conditions of Mexicans as well.

FRANKLIN PIUCK
Bay Shore, L.I., June 16, 1993

Lasting Israeli Peace Means Compromise

To the Editor:

A group calling itself Pro Israel, in a June 10 ad, assailed the Israeli Government's peace initiatives, at-

House Passes a Bill to Encourage Strikes

To the Editor:

"House Passes Bill to Ban Replacement of Strikers" (news article, June 16) incorrectly reports of H.R. 5: "The measure would apply only to part of a "recognized or certified" bargaining unit. The Edwards amendment would have addressed business concerns about increased "recognitional strikes" by nonunion

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June 21, 1993

The Editor
The New York Times
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To the editor:

It is not easy to know where to begin a response to John Lukacs (Op Ed, June 17, 1993), who not only is totally misinformed about the goals of high energy physics, but who apparently has not even the vaguest knowledge of the scientific method.

Lukacs seems to think that high energy physics in general, and the Superconducting Supercollider in particular, stand or fall on the "assumption" that there is either a "smallest building block of the universe" or a "Theory of Everything." It is easiest to point out that this is simply untrue. Neither of these is a proposed goal of the SSC. However, it is worthwhile to address some more basic points. To apply the scientific method, one makes hypotheses or theories (Lukacs prefers the more loaded term "assumptions"), then tests them with experiment. Even a hypothesis that is shown to be wrong has merit, both because it is a crucial part of the method itself and because even "wrong" theories often have chunks of truth in them. Even a succession of overturned hypotheses may be very productive. Lukacs's example is a good one: We may not use the word "atom" exactly as Democritus intended, but the current usage of the term has some truth in it: the smallest unit of sodium, for example, is one sodium atom. The "atoms" we have run across in our "useless tasks": electrons, nuclei, nucleons, quarks, have each contributed greatly to our understanding of the universe even when or if they are demoted from their proposed fundamental position. If it is our "gullibility" that has led to these discoveries, that is fine by me. Lukacs seems to think that human fallibility is a reason to evolve our consciousness beyond scientific pursuits. The scientific method was developed so that understanding could grow in spite of human fallibility. One shudders to think what Lukacs would have us install in its place.

The less said about the middle section of Lukacs's article, in which he disposes of both high energy physics and mathematics, the better. His invocation of Werner Heisenberg reminds one instead of Wolfgang Pauli, who once said of a particularly ill-posed paper, "It isn't even wrong."

Perhaps it is best to state the situation clearly. When we as high energy physicists say that we are looking for the fundamental building blocks of matter, we

do not think we are looking for the *last* link in this chain, but for the *next* one. We are not embarrassed when nature proves to be more subtle than anticipated. As for a Theory of Everything, one can fall back on a useful rule of thumb: everyone believes an experiment except the experimenter who did it; no one believes a theory except the theorist who made it.

Sincerely,

Peter D. Meyers
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