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In this search for big and preferably expensive projects, we have alienated not only the public at large but also good young physicists. During my own six years in graduate school, I saw some promising graduate students leave physics to do computer science. Their decisions were not based entirely on the job market.

Acknowledging these problems does not solve the problems of unemployed PhDs in physics. Nine years ago, my personal solution was to exit mainstream physics (as many others are doing now), even though at that time it would have been possible for me, with some effort, to stay on. I joined the faculty of a small college, ignoring the opinions of well-wishers who were certain that I was throwing away a promising career. But I have never regretted that decision. Now I do "cheap" research on topics of my own interest. Because of significant teaching responsibilities, my research progresses slowly. This I don't mind, because teaching physics (in particular to nonphysics majors) is exciting. Unlike what one of the YSN members feels, I think it is important to educate youngsters about the excitement and usefulness of physics. Doing so will ensure that we have not only a more practical set of future physicists but also a set of nonphysicists who have a more positive attitude toward physics.

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I have rarely been so saddened as I was when I read Alexander Weissman's letter in the May 1993 issue (page 11). As a preservice high school physics teacher, I am in the process of becoming one of those people who asks young students how lasers work and why the sky is blue. To read of a frustrated PhD in physics blasting the recent awareness of the inadequacy in science education makes my heart ache. Weissman cites the "nation's true attitude toward science." Although I agree that this attitude could definitely use some major improvements, how can we expect to change this attitude if we do not educate our youth about science? They are the future politicians, industry bosses, voters and parents. Without sufficient scientific literacy, competency and curiosity, our society will surely decay. We need the creative and intellectual muscle that science builds to survive in these difficult times as well as to satisfy one of our basic human needs: to explore the unknown and try to understand it.

Granted, the job market, especially with defense cutbacks, is extremely tough right now. This reality is not limited to PhDs in the sciences. Yet in our rapidly changing global economy, it seems that the only way we are going to succeed is to develop our scientific resources, including our future scientists. I'm investing my life in this endeavor. I also have no guarantees that I will have employment come graduation day, but the prospect of helping to expand young minds and make a difference in the world is enough of an incentive to keep me reaching for the stars.

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Does Turbulence Toss the Cosmic Background?

In the July issue of PHYSICS TODAY (page 13), complicated answers are given to a simple question. Robert J. Yaes (March, page 13) had asked why the cosmic microwave background, as measured by the Cosmic Background Explorer, does not constitute a privileged reference frame, in contradiction with relativity.

The universe is filled with a gas of photons, much as Earth's atmosphere is filled with a gas of molecules. Does the weather bureau's measurement of wind velocity contradict relativity?

An interesting question is whether the microwave background, like the atmosphere or ocean, is subject to turbulent motion. The 10- or 20-light-year sample available to us exhibits uniform motion. But would observers millions of light-years apart and servoed to be in inertial frames at rest with respect to one another all measure the same velocity with respect to the microwave background?

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Einstein–Bohr Debate Still Unresolved

Upon reading the letters concerning the "border between quantum and classical" (April 1993, page 13), I was struck by the fact that the debate between Einstein and Bohr is still alive. In that debate, the conservative (Bohr) insisted that the "quantum object" is not observed directly but influences an "apparatus" that records the data in a "classical" fashion. The revolutionary (Einstein) insisted that when a complete quantum mechanical theory was formulated there would be no need to include a "classical apparatus" limit as an essential ingredient in the theory. Quantum theory would then stand on its own. The notion that Einstein wished to return to a classical view is a myth. However, Einstein was unable to carry out his own theoretical program.

Bohr won the debate in the laboratory, and the notion of a classical apparatus is still put "by hand" into quantum mechanics. It is unlikely that playing with reduced density matrices for the quantum object will resolve the issue, since in averaging over the "classical environment" one is throwing away the experimental data (in the sense of Bohr). It is also unlikely that any issue will be settled by theory.

What is required for progress is an experiment in which the Bohr view fails! Anything else is merely bad philosophy. Such an experiment does not at present seem to exist.

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Don't Alter Courses for Women, Minorities

As a former college physics teacher, I strongly sympathize with the goals of the Introductory University Physics Project and admire the careful and systematic way the group is proceeding. However, I was distressed at the implication, early in the article on the IUPP (April 1993, page 32) that "science courses must meet the needs of new student groups—women, previously underrepresented minorities, new immigrant groups." These students have the same "needs" relative to physics as the traditional white male constituency—understanding, appreciation and skill. To believe otherwise is to set these students up for a self-fulfilling prophecy of second-class citizenship in the scientific community.

Because the article had no further mention of course design based on ethnic group or gender, I hope that the phrase was just decorative boilerplate! Good luck to the IUPP group in its important and difficult task.

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