if not most, HBCU physics programs are having trouble attracting, training, and retaining qualified faculty and students. I believe the problem is one of marketing, coupled with the dwindling talent pool of potential students. Middle- and high-school teachers and counselors need to promote physics as a viable academic and career choice. If HBCUs want more physics students, they need to let middle and high schools in on the secret.

When I attended secondary school, I was never informed about the opportunities or career choices available to students who pursued physics in college. The school's guidance counselor promoted engineering and computer science. During my undergraduate years at an HBCU, I noticed that engineering scholarships, grants, and stipends heavily outnumbered similar funding options for physics majors. The college and its corporate and government sponsors invested heavily in the programs and recruitment efforts for engineering.

It is well known that the talent pool of minority students ready to pursue physics as a college major is rather small. We cannot expect HBCUs to single-handedly solve that problem, but if they need more physics students, they need to help increase the talent pool. As an example, HBCUs can provide tutors and mentors to secondary-school students. Their faculty and physics majors need to be present at science fairs and actively participate—for example, by serving as judges. If HBCUs do not plant the seeds and fertilize the crops, they cannot expect a big harvest of applicants ready and eager to pursue a physics degree. In fact, all college and university physics departments, not just those in HBCUs, need to market their existence to teachers, counselors, and potential students at the secondary level.

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Williams replies: The issue of students not pursuing physics in large numbers at HBCUs is a convolution of many factors, but it boils down to a lack of financial resources. There is a common misperception that the pool of African American students is dwindling. However, according to the 2004 *Annual Status Report on Minorities in Higher Education*, published by the American Council on Education, the college enrollment rate for African Americans had risen 56% over the 20-year period beginning in 1980. More African Americans are going to college these days; however, they're not choosing to major in physics. It is not feasible for HBCU physics faculty and students to go into every high school to recruit, and guidance counselors often do not know about the myriad career paths that come with a physics degree. With more money invested, HBCU physics programs can offer more scholarships, attract high-quality faculty due to improved physical plant and science infrastructure, provide more professional development opportunities for existing faculty and staff, and produce more physics and science teachers for the secondary schools. With adequate and judiciously deployed resources, the situation can be totally changed in a few short years.

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Scientific societies should speak out

I respectfully disagree with B. K. Ridley's conclusions about the role of prestigious scientific societies in areas of

major societal consequence (PHYSICS TODAY, July 2010, page 10). Ridley argues that the Royal Society and the American Physical Society should have remained silent on the issue of climate change. My view is that not taking a position would be the height of social irresponsibility and a disservice to science.

The political discourse on climate change needs to be informed by science's best tradition of evidence-based consensus and openness to alternate interpretations. Unfortunately, a cacophony of vested interests has dominated the media and the blogosphere, often giving a false impression of balance by understating the breadth of support for the consensus opinion and overemphasizing dissenting views. The consequences have been serious for such international policymaking efforts as the unproductive 2009 United Nations Climate Change Conference in Copenhagen.

If we had time to let nature run its course, we could trust the scientific process to sort things out. Unfortunately, in the case of climate change, many broadly accepted climate models predict dire economic and social consequences if governments and individuals do not take action.

Scientific societies would be derelict by not speaking out once their internal deliberations determine that such consequences lie ahead. Individual scientists who disagree with the societies' conclusions are free—in fact are obligated by scientific integrity—to put forward alternate interpretations. In that way, the societies and the individual dissenters would work together, to quote Ridley, "to serve and promote science."

I offer an example from medicine. According to Ridley's logic, the American Medical Association and other medical societies should have remained silent as evidence grew about the harm caused by cigarette smoking. Had they done so, they would have violated their principles as healers, and millions of people would have lived shorter, less healthy lives.

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Forging more effective science conferences

The benefits of scientific conferences are well known. Scientists present results of their work, discuss their ideas, and establish personal relationships. Participation, though, is often limited due to costs; for example, to attend a conference in Europe, a US attendee could pay $3000, once fees, transportation, and lodging are included. And financial barriers are even more prohibitive for scientists from developing countries such as India and Poland.

Conferences are not always as effective as they could be. Listening to a dozen or more reports each day for five consecutive days is very demanding, especially at conferences that cover wide ranges of topics. Furthermore, the benefits of listening to reports depend in part on a listener's being at least somewhat familiar with the topic.

The contribution a conference makes to scientific progress depends on many factors, such as the number and diversity of participants, breadth of coverage, logical sequence of topics, percentage of time devoted to discussion, rigidity of the schedule, and so on. I offer here a suggestion on how conference value might be increased.

I propose dividing a conference into two parts: The first would be an opportunity to read papers online and would take place over several weeks. The second part would be a shortened, two- or three-day face-to-face meeting, rather than the five-day span that is now common.

For the first part, conference organizers could establish a time period for online reading and discussion of a group of papers related by topic. Authors would be asked to make their accepted papers available for download from the conference website, for example, one month before the scheduled meeting. Participants would have time to examine papers carefully and to post questions and comments. Currently, the usual meeting schedule leaves limited time for discussion after the oral presentations. Holding preliminary discussions over the internet could resolve most scientific issues before the face-to-face meetings.

This split approach has several noteworthy advantages. One involves the reduction or even elimination of oral presentations. A conference of two or three days' duration, consisting mainly of discussions among scientists who have already read the papers, can accomplish more than a typical five-day conference that involves dozens of oral presentations and necessarily limited discussion time. The shorter in-person conferences would be less expensive and less disruptive for the scientists who must travel to attend. Furthermore, the internet-based discussion of papers would allow attendees to better narrow the scope of their attention for the face-to-face portion and therefore make the best use of their time.

Broader participation is another advantage of the internet portion of a restructured conference. Those who cannot afford to attend the in-person meeting can still participate and add their ideas to the online discussions. Today, those who cannot attend the meetings have no way to contribute to them. Personal encounters among scientists are extremely important, but better use of the internet for conferences can reduce expenses all around and broaden the pool of contributors.

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Bologna reforms in Germany

Toni Feder gave a vivid account of Europe's struggle with streamlining its higher education system under the Bologna Process (PHYSICS TODAY, May 2010, page 24). The overall goal is the establishment of the European Higher Education Area, in which program transparency and course and degree comparability and compatibility greatly facilitate mobility across Europe and attract students from abroad. The idea has seen wide acceptance. In the implementation of the Bologna reforms, however, problems have arisen, often as a result of the strong push for standardization that disregards the diversity of countries and disciplines.

Before Bologna, German universities had five-year physics programs, and the excellent reputation of the *diplom* degree resulted in very few unemployed physicists even in economically difficult times. Consequently, the German physics community initially rejected the bachelor's/master's structure of the Bologna Process. Lawmakers, however, viewed the two-tiered degree system as a welcome cost-cutting measure at public universities and made plans to accept only 30% of the bachelors into master's programs. Reducing the education of 70% of physics students to a three-year bachelor's curriculum would allow publicly funded universities to reduce faculty and cut costs, but it would also create an ill-prepared physics workforce.

After the Bologna reforms were