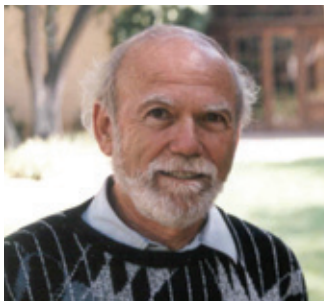

Photo: LIGO

Building a Global Design Effort

On March 18, before 400-plus people at the Linear Collider Workshop in Palo Alto, Jonathan Dorfan, chair of the International Committee for Future Accelerators, offered me the job as director of the Global Design Effort for the International Linear Collider. As I told Jonathan and my fellow workshop-goers, I accept.

Although I had held the job for approximately two minutes, I then shared my thoughts about the Global Design Effort and ILC. The International Technology Recommendation Panel for the ILC in 2004 established a precedent of acting promptly and decisively; it seemed a good one to follow.

I began by discussing the GDE organization. I plan to use the organizational approach of an experimental collaboration. We don't need a physical location to make the collaboration work during the coming ILC design phase. I don't yet know our address or phone number, or exactly how many people will hold exactly which appointments. We won't have much infrastructure, building instead on the structures at labs and universities. Like a particle physics experimental collaboration, we will establish clear priorities, roles and responsibilities.

Why is this the right approach? The biggest advantage of this scheme is that it will enable us to get the right people involved in the GDE without asking them to change where they live. Another important reason for not adopting a fixed address for the GDE is that, although I am an American and I live in America, the job of the GDE is to respond to the international community. I will report to the ILCSC (an international group) and to the worldwide members of the ILC community, with no bias toward America. I can best do this with a distributed organization.

The job of the GDE is to bring the ILC to the point where its governance can be assumed by collaborating governments. This means more than producing a design report. We must develop a robust, bullet-proof, affordable design that will meet scientific requirements. From the start, we will design the ILC with consciousness in all these areas.

We must also sell this project: to our colleagues, to scientists in other fields, and to those in government and public life whose decisions will determine our future. Can we succeed? I wouldn't have taken this job if I didn't think so. But we must make the clear, compelling case for the scientific value of the ILC. Without that, we won't go anywhere.

In observational sciences, such as astronomy and cosmology, we can trace key advances to the use of multiple approaches, including multiple wavelengths. "Multimessenger" astronomy now uses different particles or probes, such as neutrinos and gravitational waves, in additional to electromagnetic waves. Revolutionary advances in cosmology, including the observation of dark energy and the cosmic microwave background, have come from using a series of experiments such as COBE, Boomerang and WMAP. The need for different approaches in observational science is widely accepted. In inquiry-based science, including particle physics, we have at least as great a need for multiple probes to attack the extraordinary problems before us. To study dark matter, for example, we need underground detectors as well as accelerators like the Large Hadron Collider and the ILC. We must not fall into the trap of believing that the territory is already pre-empted by one particular approach.

We know more about the technology needed for the linear collider than we have for any previous accelerator project. The fundamental research is nearly complete, but much more R&D remains to be done, to decide among options and to optimize the design for performance and cost. As we go forward, the design must evolve to be better, cheaper, more robust and more reliable. We will make decisions quickly, but we will build in options for better and cheaper performance. The first three people I intend to hire in the GDE are three engineers who understand costing in the three regions–Europe, North America and Asia–to work together to understand the costs and industrialization of this machine. To be as realistic as possible, we will carry out the design for specific candidate sites. We will do value engineering in parallel with accelerator design, because we must end up with a machine that we can afford to build.

Clearly, there is a lot to do and I invite physicists of all persuasions and all nations to join the ILC design effort. To succeed, we will need to reach across the boundaries between experimental physics and machine design, between universities and laboratories, between countries and regions. This project belongs to all of us.

Barry Barish is currently Director of the Laser Interferometer Gravitational-Wave Observatory (LIGO) project and has accepted the position of Director of the International Linear Collider Global Design Effort.