EPJ manuscript No.
(will be inserted by the editor)

GLOBAL STRATEGIES FOR PHYSICS COMMUNICATION

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Received: date / Revised version: date

Abstract. The physical sciences have embarked on an era of discovery that promises to revolutionize the way we understand the nature of the universe. The international, collaborative nature of the physical sciences has never been more important. And yet, as we begin a new century and a new era of discovery in physics, this message does not always get through to those outside the field. To address the challenge of communicating physics in today's world, a new collaborative model of global physics communication is proposed.

PACS. 01.10.Hx Physics organizational activities

1 Communication Opportunities

As the twenty-first century begins, physicists around the world look forward to an era of discovery that promises to revolutionize the human understanding of matter and energy, space and time. The convergence of theory, technology and experiment across the fields of physics appears likely to change the way we understand the world around us as profoundly as the discoveries of twentieth-century physics did a century ago.

Further, the international, collaborative nature of physics experiments has never been more important, both for the advancement of the science and for the sustaining of human relationships based on scientific collaboration and the free exchange of scientific knowledge across all borders.

Yet, at this moment of such potential significance, the message of the promise and excitement of the physical sciences sometimes fails to reach beyond the confines of the physics community itself. This failure manifests itself most clearly in the steady decline of funding for nuclear and particle physics in the United States over the past decade, since the demise of the Superconducting Super Collider.

Particle and nuclear physicists work in a field that requires the largest and most expensive tools of any field of science, the accelerators and detectors required to explore the smallest reaches of the universe. Only national governments-and, in our times, only coalitions of national governments-have the resources to build them. For the frontiers of accelerator and detector technology to advance, governments must be convinced of the potential value of investments in these fields. This is true not only in the U.S. but in Europe and Asia. Currently, the world watches while CERN, the European Particle Physics Laboratory, grapples with budget and schedule issues as it struggles to complete the Large Hadron Collider, the next particle accelerator at the energy frontier. Following the recent recommendations of the Wissenschaftsrat, the German government considers whether to invest in a linear collider built at Hamburg. In Italy, the Comitato di Indirizzo per la Valutazione della Ricerca is charged to examine the entire national science enterprise, including the place of particle and nuclear physics in the national research portfolio.

In recent years, we have seen government support for other areas of science, particularly the biological and biomedical sciences, increase substantially, partly as a result of the perceived connection between investment in these sciences and their benefits for human health. At the same time, funding for the physical sciences has diminished as the benefits of investment in these fields for the nation's welfare become less clearly perceived. Throughout the world, serious questions arise about the future of "big science" physics.

2 In This Together

To an increasing extent, all of the physical sciences, all around the world, are engaged in a common endeavor. Today, discoveries at one laboratory or in one field of physics invariably build on earlier advances at other laboratories or in other fields of physics. The once-critical distinctions among astrophysics, high-energy physics and nuclear physics, for example, assume less and less significance.

Challenges at one of the world's physics laboratories immediately ripple out to confront the rest. The current budget and schedule problems at CERN have the strongest implications for the construction of future projects at other physics laboratories. Fermilab's struggles to realize the promise of Collider Run II at the Tevatron will affect all of particle physics. On the positive side, scientists from

Thomas Jefferson Laboratory collaborate with scientists at DESY, the Deutsches Elektronen-Synchrotron, and the Spallation Neutron Source on the next generation of superconducting radio frequency technology, which will have benefits for all three laboratories.

For the science of physics to succeed, we must all succeed. The time is over when one country, one laboratory or one field of physics can succeed at the expense of another. The discoveries of the future will require still greater collaboration among nations and across the fields of physics.

For example, many particle physicists and physics funding agencies have concluded that any future particle accelerator that may be built must not only be conceived as a global construction project but will require a new global operating structure to allow scientists from remote laboratories to participate in physics experiments as though they were present at the accelerator site. While solutions to the technical issues associated with such remote operation appear within reach, the human issues are another matter. Answers to the political, economic and sociological questions raised by such a global accelerator network do not come so easily. Communication sits critically at the center of the question whether such a global network can succeed.

“If physics issues had forced us to put accelerators into space,” DESY Director Albrecht Wagner likes to say, “we would have solved these technical issues long ago.” It is when they come down to earth that the problems arise.

3 A New Model of Communication

To have the kind of future that all of us want for the physical sciences, we must change the way we communicate. Communication as usual will not do the job.

Although physics collaborations are international, and fields of physics are closely interrelated, physics communication is almost always local. Every laboratory, every field of physics, every university and every region communicates for itself. While the physics is international and interdisciplinary, the physics communication is not-yet.

Just as we collaborate across all borders in physics experiments and projects, now we must also learn to collaborate in communicating physics across borders, among laboratories and universities, and among the different fields of physics. We need a new international model of physics communication to support international physics collaboration.

This task is the more daunting because, in general and unlike some other areas of science, physics does not generally come from a strong culture of communication. Physicists must create their own.

This effort will require learning to think strategically when it comes to communication-not just when it comes to solving technological challenges. Physicists will need to make communication an integral element of experiments and projects-not an afterthought, as it usually is in the current model. Finally, the world’s laboratories will need to make physics communication as collaborative as physics experiments.

In early December 2001, the communications directors of six of the world’s particle physics laboratories-DESY, SLAC, CERN, Gran Sasso, Fermilab, Brookhaven-met at DESY in Hamburg to form an international collaboration for physics communication. Since the DESY meeting, KEK, Dubna, Lawrence Berkeley Lab, Cornell, Thomas Jefferson University and the Laboratorio Nazionale di Frascati have also joined the collaboration. The group made a plenary presentation at the International Conference for High Energy Physics in Amsterdam in July 2002, along with a presentation to the International Committee for Future Accelerators and the International Linear Collider Steering Group, also in July.

In Hamburg and in Amsterdam, the group began work on a global physics communication plan. Initial actions include:

- development of a listserv for the use of collaboration members;
- creation of an ”image bank” of the best of the best photographs and graphics from the world’s physics laboratories on a common physics website, Interactions.org (www.interactions.org);
- advance press release coordination among physics laboratories;
- communications staff exchanges between laboratories;
- the inclusion of communication talks on the agenda at physics conferences;
- joint press offices and press events at international physics conferences, beginning with Lepton-Photon 2003 at Fermilab in August 2003;
- a continuing series of joint international physics communication workshops.

The group’s goal takes on new significance in the post-September 11 world. As stated by DESY communications director Petra Folkerts, the collaboration’s goal is “not only to help international particle physics stay alive, but also to find ways that we, in our field of activity, can set visible footprints for peaceful collaboration across all borders.”