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# Panel on Increasing the Visibility and Publicity for Data Activities and Assuring the Open Exchange of Data

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# Panel on Increasing the Visibility and Publicity for Data Activities and Assuring the Open Exchange of Data

David R. Schultz, Panel Chair

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**Abstract.** This panel was charged with leading and stimulating discussion regarding two principal issues: (1) the need to increase the visibility of atomic data production and collection activities in recognition of their role as vitally important resources for diverse applications, and (2) the need to assure the open exchange of this data. Comments by the panelists, supplemented by interaction with the audience, are summarized here along with the principal conclusions.

## INTRODUCTION

Atomic, molecular, and optical (AMO) data are indispensable for such diverse applications as commercial and residential lighting, astrophysics, the development of fusion energy, semiconductor manufacturing, flat panel display technology, detection and remediation of pollutants, *etc.* In addition, the collection and organization of such data is of great aid to these endeavors as well as to the advancement of the AMO physics field itself. However, it is felt that the justifications for the generation and collection of AMO data are not sufficiently well recognized within scientific funding agencies nor within the applications communities themselves. Thus, the goal of this panel session, as well as a crucial theme running throughout the entire ICAMDATA meeting, was to discuss ways in which greater visibility, and ultimately greater funding, for these activities could be obtained, and to highlight the need to assure free exchange of these vital data.

The panel concluded that

- efforts must be made to increase the connections and interactions between producers of data, collectors/evaluators of data, and users of data,
- input to governmental bodies (e.g. the U.S. Congress) and to professional societies must be given to urge improvement of the Internet and to register the

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community's opinion on the freedom of data exchange in advance of legislation which would limit access,

- communities and funders should assure access to data and implement standards of exchange, preferably through multi-national data centers, and should adopt the World Wide Web as the standard for communication, and
- it should be recognized that AMO data is of increasing importance for applications, but that the community must make a strong case to document and emphasize this to potential customers and funders.

The panel consisted of comments from Stephen Berry [1], Claudio Mendoza [2], and Stephen Younger [3], followed by discussion and questions from the audience. Summarized below are the panelists' comments.

## PANELISTS' REMARKS

In his comments, Dr. Berry emphasized issues of access to data rather than generation of data and stressed particularly the vehicles through which the community can call for action to influence policy decisions. For example, citing the congestion currently present on the Internet, especially for transoceanic connections, caused by the swelling commercial and entertainment sectors crowding out the science and education users, he called on the community to speak out within our professional organizations and especially directly to the U.S. Congress.

Dr. Berry also pointed out the recent furious debate over the degree of protection to be applied to the Internet, reflecting attempts to balance public interest with private intellectual property rights. This translates in the scientific and applications arenas to issues of whether data produced using public funds should be freely exchanged or restricted. This issue is particularly thorny regarding the transborder flow of information, and was a principal focus of the National Research Council's U.S. National Committee for CODATA report entitled "Bits of Power" [4]. This committee's report opened the debate and tried to reflect the diversity of all the concerned parties' points of view. Dr. Berry concluded by urging the AMO community to watch American Physical Society publications for calls to provide input to this debate, and to directly reach out to members of Congress who will be considering legislation pertaining to the freedom of access to information over the Internet.

Dr. Mendoza's comments reflected his experience in the theoretical production of large amounts of AMO data and in computer-based methodologies for distributing these data. For example, he cited the sheer size of the AMO data files produced by such enterprises as the Opacity Project as necessitating electronic distribution of the information through databases. Even so, scientists involved in producing and making available such data are not in business, but rather obtain funding from traditional science funding agencies. Thus, he emphasized the need for institutionally based data resources such as the Centre de Données Astronomiques de

Strasbourg (CDS) which provides a reliable, persisting source on the World Wide Web through which Opacity Project data, and other resources, can be distributed. Such centers allow the user to not question the authenticity and reliability of the electronic resource.

Moreover, he stressed the role of data centers in providing standards for data exchange, assuring the timely updating of information, and guaranteeing quick and reliable access. Dr. Mendoza called for data centers to seek to minimize the differences that users see from center to center, and to actively promote data collection and dissemination, a job which they are better suited to than the individual producers of data. Further, he emphasized that data centers would best cover the wide scope of AMO data and best assure universal access if they were multi-national in constitution and use the present *de facto* standard of Web-based data exchanged.

Recognizing the need of users to have access to evaluated data, since potential users may not be expert in all relevant subfields, Dr. Mendoza pointed out the difficulty, or, in fact, near impossibility, of assigning individual evaluations to each datum in enormous sets of data generated by theoretical models that is nonetheless crucial for applications. He concluded his remarks by giving his perspective of the accessibility of data in developing countries. He noted that third world countries have been motivated by economic reasons to provide good connections to the World Wide Web since the cost of maintaining traditional libraries is so high. However, to this point developing nations lack the required technical expertise and sufficient support of infrastructure to allow the much dreamed of seamless access. Dr. Mendoza also pointed out that many resources which are free to U.S. and European users are only available in the third world for a fee.

Dr. Younger pointed out from the outset of his comments that the defense community does indeed have important needs for AMO data, and that these needs should be even greater in the future. He described the broad present and potential requirements for such data by tracing a typical battlefield scenario. For example, command, control, communication, and intelligence (C<sup>3</sup>I) functions involve the use of sensors which must look through the atmosphere, and therefore, AMO data is needed which provides the foundation of analysis of atmospheric phenomena. The ordinance must then reach the target, and the physics of ionized air and of the interactions of solids (such as missiles) with plasmas is important in predicting how weapon systems will perform. Explosives involve molecular processes, and recent interest is focussed on making high explosives safer during storage and handling without degrading performance when delivered onto a target.

The simulation of nuclear weapons explosions, which encompasses the description of matter over a very wide range of temperature and density, has been a major application of broad class of AMO data. Dr. Younger pointed out that the Comprehensive Test Ban Treaty which eliminates the ability to test nuclear weapons, could drive the need for AMO further, due to the exclusive reliance on simulation to assure the safety and reliability of the nation's nuclear stockpile. In the U.S. the Accelerated Strategic Computing Initiative has been instituted in order to increase by a factor of one hundred thousand the computational power available by the

year 2004. This would result in a 100 TeraFLOPS machine capable of aiding in such weapons simulation through complex hydrodynamics and radiation transport calculations.

Thus, the AMO community should expect these efforts to drive new needs for data, and to present a new opportunity to use facilities to generate AMO data. In a broad sense, these new computers could revolutionize how machines are used to generate information. Dr. Younger concluded by emphasizing the opportunity that the AMO community has to provide data and utilize these computational resources, but that it must also clearly demonstrate the relevance of AMO physics to defense to have its requests heard.

## REFERENCES

1. R. Stephen Berry is the James Franck Distinguished Service Professor, Department of Chemistry, at the University of Chicago. He is a member of the National Academy of Science, and Chair of the National Research Council Committee on Issues in the Transborder Flow of Scientific Data.
2. Claudio Mendoza is the Head of the Physics Center at the Venezuelan Institute for Scientific Research, Caracas, Venezuela. He is a member of the Opacity Project and the IRON Project, and has been involved in the development and maintenance of atomic databases for the astrophysical community at the Centre de Donnes Astronomiques de Strasbourg, France, and Goddard Space Flight Center, U.S.A.
3. Stephen Younger is the Program Director, Nuclear Weapons Technologies Programs, at Los Alamos National Laboratory. He has been an active member of the atomic physics community and producer of atomic data.
4. "Bits of Power: Issues in Global Access to Scientific Data" (National Academy Press, 1997) is accessible at <http://www.nap.edu/readingroom/enter2.cgi?RI.html>. See also the report in this volume by R.S. Berry.

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