## **Bob Siemann**

# Brookhaven and the American Physical Society

Marty Blume
APS Editor-in-Chief Emeritus
BNL Emeritus

## DESIGN AND PERFORMANCE OF THE MULTIPARTICLE ARGO SPECTROMETER SYSTEM\*

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The Multiparticle Argo Spectrometer System, MASS, consists of a magnetic vertex spectrometer, two external trigger spectrometers, an on-line monitoring system and an off-line data analysis

chain. The performance of MASS has been evaluated from physics data taken in a study of 28.5 GeV/c pp collisions covering a large range of transverse momentum.

## Bob and the BNL Light Source 1983-1987

I must disagree with your characterization of the relationship between machine builders and users as a "service- to- customer commitment". Design and construction of an advanced state-of-the art device is more than that, and we do not regard users as customers, but rather as fellow scientists working on different aspects of the problems. In any event, We hope to have the x-ray ring on line as soon as possible.

With best wishes,

Sincerely,

M. Blume

Associate Director

MB/jns

### **Bob and the APS**

- Division of Physics of Beams
- Physical Review Letters and Reviews of Modern Physics
- Physical Review Special Topics -Accelerators and Beams

#### Physical Review Special Topics-Accelerators and Beams

American Physical Society



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Topics - Accelerators and Beams Essay: Accelerators, Beams and Physical Review Special Topics -

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Accelerator science and technology have evolved as accelerators became larger and important to a broad range of science. Physical Review Special Topics - Accelerators and Beams was established to serve the accelerator community as a timely, widely circulated, international journal covering the full breadth of accelerators and beams. The history of the journal and the innovations associated with it are reviewed

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#### I. ACCELERATOR SCIENCE AND TECHNOLOGY

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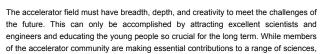
Announcements, and Editorials » Essay: Accelerators, Beams and Physical Review Special

Accelerators and Beams (May 22, 2008)

Accelerators and the beams they produce are critical for a broad range of sciences. In addition, the study of accelerators and beams is, by itself, an interdisciplinary science with interplay between considerations ranging from basic physics to engineering. It is a discipline that evolved over time as the small accelerators that were commonplace at universities were replaced by the national and international laboratories needed for exploration of the energy frontier of particle physics. Another equally important trend has been the increasing breadth of science enabled by accelerators. These factors have resulted in profound changes in the practitioners of accelerator physics and technology. They evolved from being predominantly university based and engaged with accelerators as part of research in particle physics to being concentrated at laboratories

There are interconnected consequences of this evolution including a tenuous connection with universities, a service component of accelerator science, and informal ways of disseminating results. Universities are the heart of intellectual and scholarly endeavors with their vibrant atmosphere, breadth of pursuits, and the stimulation that comes from students bringing energy, excitement, and creativity to their studies. The service component of accelerator science was an inevitable development because funding is almost always tied to the science being served rather than to the instruments producing the science. Finally, the standards of universities for promotion and recognition, which include publication of peer reviewed articles, are not as important for a service profession, and accelerator work was often published informally.

These consequences are natural and there would be little downside if accelerators were not the limiting factor in so many sciences. Operating accelerators are always striving for better performance; higher beam current, higher luminosity, greater beam brightness, etc., and optimizing performance and controlling costs are of major importance in designing new accelerators. Often these will require understanding basic accelerator physics. The electron-cloud effect is an example with critical importance for B-factories, spallation neutron sources, and the Large Hadron Collider, among others. The frontiers of science are often shaped by accelerator physics and technology. As examples, superconducting rf has opened up a world in nuclear physics and neutron production; the short x-ray pulses from free electron lasers will revolutionize atomic and molecular physics, and accelerator science will determine the future of its progenitor, particle physics, where inventions are needed to overcome size and cost limitations.





their peers are other accelerator scientists and their professional interests are related to accelerators and beams. Therefore, it is essential to value the advancement of knowledge of accelerators and beams as well as contributions to other sciences

#### II. THE DIVISION OF PHYSICS OF BEAMS

The Division of Physics of Beams (DPB) of the American Physical Society (APS) was an important step in doing this. The division was established in 1985 with the objective of "the advancement and diffusion of knowledge regarding the nature and behavior of beams and the instruments for their production and use. ... In addition, the Division of Physics of Beams: (i) promotes research and development in the science of beams; (ii) encourages scholarly publication; (iii) promotes education in beam science and technology; and (iv) enhances the professional

Encouraging scholarly publication is one of the DPB objectives. Peer review, which authors and readers benefit from substantially, is an integral part of scholarly publication. A knowledgeable colleague carefully reads a manuscript and gives a frank opinion whether it presents correct, new and important results. In addition, the referee often gives helpful criticism that can improve content and presentation. Acceptance and publication of a manuscript is an indication that the work has been judged to be making a meritorious contribution. For this reason peer reviewed publications are considered a measure of an individual's scholarly accomplishments. This measure is particularly important for universities, and it can play a crucial role in hiring and promotion.

The DPB initiated a study of peer reviewed publications in accelerator and beams in 1997. A conclusion of the study was that while many

Meetings and Events

journals published such articles there was no single, widely circulated journal with this as the focus. As a result the literature was fragmented and not effective as a means of communication within the accelerator community. The division recommended establishing a scholarly, peer reviewed journal devoted to the science and technology of accelerators and beams that would (1) cover the full breadth of accelerators and beams, (2) be timely, (3) be inexpensive to promote wide circulation, and (4) be international with an international editorial board and pool of referees. This recommendation led to the establishment of *Physical Review Special Topics - Accelerators and Beams* (PRST-AB) [2].

#### III. THE EARLY DAYS

The recommendation reached the American Physical Society at a most opportune time. Marty Blume was the APS Editor-in-Chief. He had previously served as Chair of the National Synchrotron Light Source Department at Brookhaven, and this experience gave him appreciation for accelerator science itself and for the contributions accelerators were making to a wide range of science. In addition, he understood the intimate connection between accelerator science and accelerator technology, and he was willing to champion an editorial policy of publishing both science and technology. This was critical for covering the full breadth of accelerators and beams.

The other factor that made the timing opportune was that the APS recognized that scholarly publication was moving rapidly from hardcopy to electronic format. A small journal like PRST-AB would be an ideal initial effort where lessons could be learned before embarking on electronic versions of the much larger, established *Physical Review* journals.

Electronic publication satisfied the objectives of timely publication and the potential of wide circulation. However, it had the problem of covering costs, which include, among other things, editorial expenses, composition and production costs, and the costs associated with buying and maintaining servers. Charges to authors or readers would be a significant drawback when establishing a new journal, and it was decided to seek sponsorship from laboratories with large accelerator programs instead. Eight U.S. laboratories agreed to be the initial sponsors, and the APS covered the shortfall in the beginning as a service to the accelerator community and in recognition that PRST-AB was a testing ground for electronic publication. As a result, PRST-AB was available to authors and readers at no cost and without a subscription.

Sponsorship has grown steadily, and PRST-AB now has twenty sponsors: (i) Argonne National Laboratory, (ii) Brookhaven National Laboratory, (iii) The Cockcroft Institute, (iv) Cornell University Laboratory for Elementary-Particle Physics, (v) Deutsches Elektronen-Synchrotron (DESY), (vi) 11th European Particle Accelerator Conference (EPAC '08), (vii) European Organization for Nuclear Research (CERN), (viii) Fermi National Accelerator Laboratory, (ix) Gesellschaft für Schwerionenforschung mbH (GSI), (x) INFN-Laboratori Nazionali di Frascati, (xi) INFN-Laboratori Nazionali di Legnaro, (xii) INFN-Laboratori Nazionali del Sud, Catania, (xiii) Lawrence Berkeley National Laboratory, (xiv) Los Alamos National Laboratory, (xv) National Superconducting Cyclotron Laboratory at Michigan State University, (xvi) Oak Ridge National Laboratory, (xvii) Princeton Plasma Physics Laboratory, (xviii) Stanford Linear Accelerator Center, (xix) Thomas Jefferson National Accelerator Facility, and (xx) TRIUMF-Canada's National Laboratory for Particle and Nuclear Physics. Because of their generous support, PRST-AB continues to be provided without charge to authors or readers.

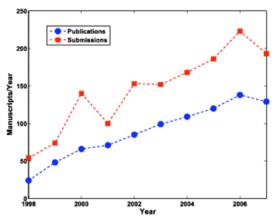


FIG. 1. PRST-AB submissions and publications.

Publication of PRST-AB was approved by the APS Council in November 1997, and I was appointed the Editor shortly afterward. A critical meeting was held at the APS Editorial Office in early 1998. It was decided to move forward on an aggressive schedule with the target of being prepared to accept the first submissions in March. This was accomplished. The first PRST-AB submission [3] was received on March 2 and published on May 12. PRST-AB has grown steadily since that first submission (Fig. ). In 2007 193 papers were submitted, and 129 papers were published.

#### IV. INITIATIVES AND INNOVATIONS

PRST-AB is a small, electronic journal in a specialized field with a publisher who is interested in and encouraging of innovation. Sponsorship was one of the most profound and significant ones. As a consequence of sponsorship PRST-AB is freely available, making it one of the first open access journals and a harbinger of the developments at the forefront of scientific publication today.

It was a goal from the beginning to make PRST-AB a truly international journal. Initially this was done informally through the selection of members of the Editorial Board and by using referees from all over the world. These practices have continued to this day. A more formal arrangement was made in 2002 with the European Physical Society Accelerator Group (EPS-AG) [4] when they joined with the APS-DPB to form the Affiliated Professional Groups of PRST-AB. Together they share the responsibility for the health and vitality of the journal by providing advice and encouraging scholarly publication in accelerator science and technology. The EPS-AG has been instrumental in securing sponsorship from laboratories in Europe, and as part of this agreement either the Editor or an Associate Editor is from Europe.

There were a number of innovations related to the electronic only format. These included the following.

All electronic editorial process.—All communications with authors, referees, and editors were electronic and provided the first APS experience with an all electronic editorial process. PRST-AB is now integrated with the "paperless" office used for all the APS journals.

Special editions, conference editions, and special collections.—The all-electronic nature allows editions of peer reviewed articles that are

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associated with conferences or that are about a closely related subject. These articles are published in a regular monthly issue as well as being added to the "special" Table of Contents that is updated when the article is published.

"Virtual Journal" of accelerator related articles published by the APS.—Links to beam physics articles in *Physical Review Letters* and *Physical Review E* are available on the PRST-AB Table of Contents so readers can find links to all of the accelerator related articles published by the APS in one location.

Single column PDF format.—The standard, double-column APS format is not easy to read on a computer screen, and PRST-AB articles are published in single- and double-column formats.

Movies.—Some things can best be visualized with a movie rather than a static figure, and movies can be included in articles. This has not been used by many authors to date, but looking at Optics Express [5] gives one an appreciation for the potential of this manner of presentation.

Readers requested other features that have been implemented.

Review articles.—Reviews of topics of particular interest to accelerator scientists and engineers are published.

Monthly Email notification.—The Table of Contents of each monthly issue is Emailed to interested parties. More recently RSS feeds have been made available for all the *Physical Review* journals.

#### V. PRST-AB, ACCELERATORS AND PUBLISHING

PRST-AB is a timely, widely circulated, freely available, international journal devoted to accelerator science and technology. It has become the premier scholarly, peer reviewed journal in this field. It is part of what is needed to advance the knowledge of accelerators and to attract excellent scientists and engineers. By doing this it will have a significant impact both within this field and in the broader range of sciences that depend on accelerators.

In addition, PRST-AB had the good fortune of opportune timing combined with a publisher interested in serving the physics community and exploring new methods of publication. As a result PRST-AB was an early, successful experiment in electronic, open access scientific publication.

PRST-AB would not have been possible without Marty Blume. Debbie Brodbar is the PRST-AB Senior Assistant Editor. She began her crucial role of providing assistance with and insight into PRST-AB editorial matters from the very beginning. Chris Wesselborg was the Project Manager who oversaw the implementation in early 1998 that took the journal from an idea to realization. I wish to thank Judy Franz, the APS Executive Officer, and Tom McIlrath, the APS Treasurer and *Physical Review* Publisher, for their support of PRST-AB and the accelerator community. PRST-AB started as an initiative of the Division of Physics of Beams. Martin Reiser was the DPB Chair who commissioned the study of accelerator publication and was a strong backer of establishing PRST-AB. Mel Month was the DPB Secretary/Treasurer for many years. I learned much from him about accelerator science and scholarship. Many people at the APS Editorial Office in Ridge, NY, made important contributions. In particular, I want to acknowledge Stanley Brown, Bob Kelly, Bill Rushka, Mark Doyle, Arthur Smith, Margaret Malloy, Joanna Popadiuk, and Evelyn Flores. Angie Seymour and Stephanie Santo provided invaluable editorial support for me at SLAC. Mike Poole, Francesco Ruggiero, Brant Johnson, and Chris Wesselborg were Associate Editors during my tenure, and I wish to thank them for their contributions and hard work. Thanks also to the members of the Editorial Board. They were an excellent sounding board and always willing to help with difficult papers. Frank Zimmermann is the present Editor, and Georg Hoffstaetter and Brant Johnson are the Associate Editors. They took over PRST-AB about a year ago, and I am delighted to see it thrive under their leadership. I hope they find the satisfaction that I did.

<sup>1</sup>Robert Siemann is a Professor of Particle Physics and Astrophysics at the Stanford Linear Accelerator Center. He earned a Sc.B. degree in physics from Brown University in 1964 and a Ph.D. in physics from Cornell University in 1969. He returned to Cornell in 1973 as a faculty member in the Physics Department after a postdoctoral appointment at SLAC and a staff position at Brookhaven National Laboratory. He rose through the faculty ranks at Cornell, and his professional interest shifted from experimental particle physics to accelerator physics. He joined the SLAC faculty in 1991 and is also a Professor of Applied Physics, by Courtesy, and the head of the Advanced Accelerator Research Department. His present research is in the areas of plasma and laser-driven acceleration. He was the Editor of *Physical Review Special Topics - Accelerators and Beams* from its founding in 1998 through 2007.

- 1. Abstracted from the DPB homepage http://units.aps.org/units/dpb/index.cfm.
- 2. http://prst-ab.aps.org/
- 3. F. Clapier et al., Phys. Rev. ST Accel. Beams 1, 013501 (1998).
- 4. The EPS-AG homepage is http://epac.web.cern.ch/EPAC/EPS-AG/Welcome.html.
- 5. Optics Express published by The Optical Society of America and available at http://www.opticsexpress.org.

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#### **Author:**

Ken Peach

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#### Viewpoint

#### Join the open-access revolution

Ken Peach argues that particle physicists can lead the way in a paradigm shift in scientific publishing to give everyone free access to research results.

There is a quiet revolution under way in academic publishing that will change how we publish and access scientific knowledge. "Open access", made possible by new electronic tools, will give enormous benefits to all readers by providing free access to research results.

The scientific articles published in journals under the traditional publishing paradigm are paid for through subscriptions by libraries and individuals, creating barriers for those unable to pay. The ever-increasing cost of the traditional publishing methods means that many libraries in Europe and the US - even the CERN Library, which is supposed to serve international



Ken Peach

researchers at a centre of excellence - are unable to offer complete coverage of their core subjects.

In 2003 the Berlin Declaration on open access to knowledge in the sciences and the humanities was launched at a meeting organized by the Max Planck Society. Six months later, the first practical actions towards implementing the recommendations of the declaration on an international level were formulated at a meeting held at CERN in May 2004. So far the declaration has been signed by 61 organizations throughout the world, which are now taking concrete measures for its implementation.

An obvious prerequisite for open access is that institutions implement a policy requiring their researchers to deposit a copy of all their published works in an open-access repository. The Council for the Central Laboratory of the Research Councils' library committee in the UK sponsored such a project, ePubs, with the aim of achieving an archive of the scientific output of CCLRC in the form of journal articles, conference papers, technical reports, e-prints, theses and books, containing the full text where possible (*CERN Courier* May 2005 p44).

The feasibility study, carried out from January to March 2003, demonstrated the business need for this service within the organization. The data, going back to the mid-1960s, can be retrieved using the search interface or the many browse indices, which include year, author and journal title. In addition the ePubs system is today indexed by Google and Google Scholar. The scientific content of the system has further led Thomson ISI (the provider of information resources including Web of Knowledge and Science Citation Index) to classify ePubs as a high-quality resource.

The next step is to encourage the researchers - while of course fully respecting their academic freedom - to publish their research articles in

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open-access journals where a suitable journal exists. In recent years new journals applying alternative publishing models have appeared in the arena. The problem so far is that none of these journals have a long-term business model. They are sponsored either by a research organization or by other titles in the publisher's portfolio, or enjoy sponsorship that will not last forever.

Scientific publishing has a price and will continue to have a price, currently mainly covered by academic libraries through subscriptions. Moving to an open-access publishing model should dramatically reduce the global cost for the whole of the academic community. The publication costs should be considered a part of the research cost and the research administrators should budget for these when the research budgets are allocated. However, a change must not take place without safeguarding the peer-review system, which is the guarantor of scientific quality and integrity.

Outside biology and medicine, few journals that support open access are given the same academic credits as the traditional journals. This situation is further reinforced if there is a direct coupling between research funding and the "impact factors" of journals where results are published. However, by taking the risk and publishing important work in new journals that implement the open-access paradigm, the impact factor will automatically be enhanced.

The example of the *Journal of High Energy Physics* (JHEP) is striking. This relatively new journal was launched by the International School for Advanced Studies (SISSA) in Trieste in 1997. Today some studies give it an impact factor close to that of Physical Review Letters in publishing papers on high-energy physics. JHEP was launched ahead of its time and was forced, because of the lack of financial support, to become a subscription journal. However, with the support of the main physics laboratories, it would be possible in the present climate for this successful journal to enter the open-access arena once again.

If a change is wanted, it is up to us. Particle physics cannot change the world alone, but a clear position among our authors and our members of editorial boards will have a strong synergy with our colleagues pulling in the same direction in other fields.

• For more about the Berlin Declaration see www.zim.mpq.de/openaccess-berlin/berlindeclaration.html.

#### Author:

 $\label{eq:condition} \mbox{Ken Peach, director of particle physics, CCLRC Rutherford Appleton Laboratory.}$ 

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#### Open access in accelerator physics

It pleases me that the CERN Courier, itself an open-access journal, has put the debate of scientific publishing on the agenda. Ken Peach's "Viewpoint" (CERN Courier June 2005 p50) is an excellent contribution to the discussion and should be carefully read by everyone in the publication chain.

In the field of accelerator physics a major fraction of our literature is nowadays made available through open-access publications. Our main conference series, i.e. PAC, EPAC, and APAC, are all published as open-access through JACoW

(http://accelconf.web.cern.ch/AccelConf/). Our scientific articles are to a large extent submitted to Physical Review Special Topics – Accelerators and Beams (PRST-AB), a peer-reviewed, all-electronic journal published by the American Physical Society. The journal is available to everyone without subscription or pay-per-view fees and even without author charges, all thanks to the support of sponsors.

PRST-AB has quickly become the primary means of communicating new results in accelerator physics, but so far, unfortunately, no European institutions are among its sponsors. I hope that this situation will soon change to ensure the continuity of open-access publishing in accelerator physics.

Frank Zimmermann, CERN.

#### A question of sponsorship

Ken Peach's article on open access was met, on my part, with a combination of a grain of salt and wry amusement. The American Physical Society started an all-electronic open-access journal called Physical Review Special Topics – Accelerators and Beams that has been successfully published since 1998. The journal has been endorsed by the Division of the Physics of Beams of the APS and the Accelerators Group of the European Physical Society. It has been supported by sponsorship contributions from large accelerator laboratories in the US and Canada, with no charges either to authors or to readers. This only partially covers its costs, and the shortfall has to be made up by the APS. This is sustainable in the short term, but becomes an increasing burden as more articles than the current 10 per month are published.

Periodically I hear of endorsement by one or another part of CERN for open-access journals, but in spite of occasional requests CERN

has declined to become a sponsor of PRST-AB. To date 52 articles have been published with one or more CERN authors, and more have been based on results from CERN accelerators. Isn't it time that CERN – one of, if not the, largest accelerator laboratories in the world – came forward?

Martin Blume, editor-in-chief, APS.

### Sponsoring open access: more than just wry amusement (November 2005)

I am delighted to witness the high interest in open access that exists and has been demonstrated by the series of letters on the topic recently published in these pages. In addition, a well-attended debate on "The changing publishing model" held at CERN in September shows that physicists are concerned with this issue.

Following the endorsement of the new CERN publishing policy in March, the library has taken certain steps to support open access where it can. It is therefore my pleasure to announce that CERN will be, as of 2006, the first European financial sponsor of Physical Review Special Topics – Accelerators and Beams. I hope publishers and editors of journals in particle physics will also consider a similar model: in the current climate a publishing model based on sponsorship shows significant potential, at least for the megasciences.

For the future, I would like to propose that we do not mix peer-review and long-term archiving into the debate. Both are of obvious importance, but neither is relevant to the difference between open-access publishing and the traditional model. The open-access model can of course incorporate peer-review, and with regards to archiving, even traditional subscription journals will most likely be electronic-only in a few years. The real debate is how to finance publishing activities and at the same time ensure equal access for everyone to results from publicly funded research.

A change to full open-access publishing cannot be made by one of the actors in the publishing chain alone. CERN is therefore hosting, in December, a tripartite meeting, which will include funding agencies, research organizations and publishers who already implement some form of open-access publishing. At the workshop we will hope to use our years of open-access experience to work

out a common strategy for the transition to the new publishing paradigm.
Corrado Pettenati, CERN Library.