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**Physics Conference Proceedings and the Electronic Environment—an Investigation of New
Dissemination Patterns.**

Michael Fosmire

Abstract:

The electronic publication of articles from physics conference proceedings on the arXive preprint server and on dedicated conference web sites is investigated. Several subdisciplines within physics were sampled. Except for high-energy theory conferences, and to a lesser extent astrophysics, there is almost no publication of proceedings articles on the preprint server. Only one conference out of all those sampled had a web site with conference presentations on it. That web site contained audio files of the presentations and images of the overheads used and thus had much different content than the published proceedings.

Keywords: conference proceedings, preprints, electronic publishing, physics literature

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Introduction:

Conferences provide a valuable opportunity for researchers to receive updates on work in their field and explore cutting edge ideas and theories of specific topics or themes within their area of specialty. The results presented at conferences are frequently works in progress, and presenters often solicit feedback from the audience on the significance or validity of their findings. As such, conference proceedings are usually of quite a different character than the traditional journal literature. Whereas proceedings are often short, at most lightly edited and peer-reviewed, and concentrate on interesting and novel aspects of the results, formal journal articles are likely to develop a topic more thoroughly and exhaustively. Indeed, topics presented at conferences are often written up more completely in the journal literature, and, as such, the utility of proceedings may decrease rapidly over time.

Despite the need for fast dissemination of proceedings in order for the information to be useful to researchers, print publication of proceedings is often rather slow. Often one finds proceedings published more than one year after the conference took place, and it is not too uncommon for the proceedings to come out two or more years after the conference. This practice takes place in proceedings published in journals as well as those published as monographs. Part of this delay is caused by the authors themselves, and proceedings editors frequently complain about the difficulty of obtaining papers from presenters. Sir Michael Berry captures the sentiments of many authors when he considers the writing of proceedings something that has to be endured in order to justify being paid by their institution (or conference organizers) to attend a conference in some exotic location.¹ Part of the delay, however, is the typical backlog of papers in journal issues or the actual typesetting and printing of monographs. Whereas speed of dissemination is important when it comes to conferences, the current formal process of proceedings publication is certainly less than optimal.

Electronic publishing, however, is characterized by rapid dissemination of information and potentially lower costs (if a complete divestiture from paper can be achieved). In particular, electronic preprint

servers have been embraced by researchers in many disciplines,² most notably by the physics community's server at Los Alamos (www.arXive.org). Since many physicists already compose their articles in the standard electronic format of the field and post them on the Los Alamos preprint server (for example, over 90% of Physical Review D articles are posted on the preprint server before they are published in the journal³), the skill sets and inclination are already present to communicate electronically. Indeed, James Langer discussed the question of whether string theorists even needed the formal journal literature, as they believe all they need is on the preprint server.⁴ Since conference proceedings would seem to have many of the same properties and goals as preprint servers (need for fast dissemination, provision of updates on work, requests for feedback, lack of peer-review), it would seem, a priori, that electronic publishing of proceedings in this format would be commonplace.

Looking beyond mere preprint server publications, the electronic environment can also provide alternate formats that capture more of the feel of the actual conference itself—for example, actual video or audio broadcasts of the talks, copies of the overheads, simulations or animations, etc.⁵ It can include some of the question and answer period that is typically missing from the printed proceedings, but which scientists often think is the most valuable part of the talk. Indeed, the multimedia conference presentation (at least sight and sound) inherently provides information in a much different format than the printed proceedings.

A non-trivial part of the publication equation is the cost to libraries, which translates to access for users. Allen⁶ found that almost 10% of pages published in journals in 1990 were conference proceedings, and, in 1990, Barschall and Haeberli⁷ found a physics conference proceedings published in a journal cost a library, on average, \$670, with the costs ranging from \$80 to \$2400. Monographic conference proceedings were found to cost, on average \$60, varying between \$0 and \$359. Even as acquisition budgets have remained relatively flat over the last 15 years and Association of Research Libraries statistics show a 26% decrease in the annual number of monographic titles purchased between 1986 and 1999⁸, the number of conferences is continually increasing. Consequently, with serial cancellations

becoming standard in the sciences, and monograph purchasing down, it is safe to say that libraries are acquiring an ever smaller percentage of the conference literature.

Since librarians cannot even acquire the same fraction of proceedings produced from year to year, we need to see if alternative ways can be found to meet the information needs of our users. It would appear that electronic publishing and conference proceedings would naturally go together. Whereas conference proceedings are often not published until more than a year after the conference took place, the final, formal journal articles may be published before the preliminary (conference) ones. With electronic dissemination of proceedings, the results of the proceedings will be available in a timely manner, so they can be of maximum use to the physics community. Since pagination and binding is not an issue, publication can be at the article level, instead of the proceedings level, so editors do not have to wait for all the articles to come in before they start publishing the proceedings. In addition, the potential for multimedia proceedings productions would allow for a much truer archive of the events of the conference, as the printed proceedings often include ‘only a small portion of the information transfer’⁹ and the final printed paper may bear little resemblance to the presentation actually given at the conference, as authors incorporate suggestions from the audience and new developments they discover in the interim between the conference and its publication.

So, with needs and capabilities so closely aligned, the question is whether scientists and conference organizers have started disseminating information in this way. One indication that there is movement in this direction is the recent formation of an electronic conference proceedings archive in high-energy physics at the Stanford Linear Accelerator, eConf¹⁰ (as of October, 2000, there were two conferences in the archive). In a parallel development, in response to user input, the fledgling chemistry preprint server, ChemWeb, has added an option that lets an author tag their preprint as a proceedings article.¹¹ This article investigates the extent to which conference proceedings articles in physics have been published electronically, either at the Los Alamos preprint server, or on a conference website.

Methodology:

An analysis was done on five conferences in each of seven subject areas (string theory, high energy theory, high energy experiment, high energy phenomenology, superconductivity, liquid crystals, and astrophysics). For the purposes of this study, high-energy theory refers to high-energy theory that is not phenomenology or string theory (the kinds of articles found in the hep-th section of the Los Alamos archive). Collective references to high-energy theory refer to all three of these subject areas.

Superconductivity and liquid crystals will be referred to collectively as condensed matter physics. Ten articles were randomly selected from each conference proceedings (occasionally less than ten articles were published in the proceedings, so in that case all the articles were searched), and the papers were searched for at the Los Alamos preprint server, with the searches being done by authors' names as the bibliographic item most likely to be consistent between instantiations. Furthermore, search engines (alta vista, google) were consulted to attempt to identify conference web sites to see if the proceedings were available there. The five conferences in each subject area were picked from those that resulted from searches of INSPEC and OCLC's WorldCat for proceedings that were published in 1999. This meant the conference proceedings analyzed were recent, yet old enough that, if they were going to be posted electronically, they would have been by then. Manual inspection of the results was done to select those conferences that dealt exclusively with the subject area under investigation.

Results and Discussion:

Out of all the conferences investigated, only one, STRINGS '99¹², had proceedings available on a conference web site (STRINGS '98 is also available in this format). This proceedings shows how different the actual conference is from the written proceedings. STRINGS '99 is published in Classical

and Quantum Gravity, and the papers there are, naturally, more formal and well-developed than the overheads used in the talk. However, the audio proceedings gives one the feeling of being at the seminar, showing which points or equations were stressed in the talk, and including everything down to the inaudible questions from the audience, people coughing, etc. The majority of the rest of the conference web sites were dead links, and those conferences that still had web sites available basically only included registration/hotel information, a list of invited speakers, etc.

The proceedings articles available on the Los Alamos server show a marked disparity across disciplines (see Table 1). The high energy theory conferences (including string theory and phenomenology) have a large percentage of papers available on the archive, just as they have a large percentage of their papers in the journal literature available in the archive. Surprisingly, high-energy experimentalists did not have any conference proceedings articles published on the preprint server. Since they have a long-standing tradition of posting journal articles on the server, perhaps there is a social phenomenon that accounts for this difference in publishing habits. Conversations with some physicists indicated that, indeed they don't tend to publish proceedings on the Los Alamos site, perhaps because they have to get an entire experimental group (of hundreds of scientists) to agree to this kind of distribution pattern, making this subset of high energy physicists less adventurous than the theorists, who work in at most small groups.

Astrophysicists have similarly frequent preprint citing habits as high energy physicists¹³, and they have similar communication requirements as the high energy experimentalist groups (i.e., large collaborations, usually from geographically disparate areas, having to share resources with other research groups). Thus, one would expect astrophysicists to, perhaps, have similar citing habits to the high energy community.

The results indicate that they have publishing patterns between the two groups (high energy theorists and experimentalists). Similar to the high energy disciplines, almost all of the authors of conference articles that were analyzed appeared in the Los Alamos archive, but the overwhelming majority of entries in the archive were to refereed journal articles, rather than conference proceedings. Perhaps some of the

intermediacy of the results between the experimental and theoretical publishing patterns is due to a mixture of theoretical and experimental papers in the sample, although among the analyzed articles available on the Los Alamos archive, several were of experimental origin. Astrophysics experimentalists work in much smaller groups than their high-energy counterparts (in groups of tens rather than hundreds), so, continuing the supposition, that may lead to greater flexibility in publishing options.

The two condensed matter physics disciplines had a much lower incidence of the author appearing at all in the preprint database, on the order of 20%. Thus, one would expect that the conference proceedings available on the preprint server to be much lower than that for high energy physicists, as was seen. It appears in general that the degree of acceptance of the preprint server for dissemination of research results is lower in these areas of physics, whether for journal articles or conference proceedings articles.

It appears that physicists in general are not putting their conference papers on the preprint server at the same rate as they do for journal articles. Typically, once an author has prepared an article for publication, it is not much more work to post it to the preprint server. This points, perhaps, to a motivation issue. Berry¹⁴ indicates that scientists generally are not happy about having to produce written proceedings of their talks, and also points out that, with the increasing number of conferences taking place (typically at least one per week in any given discipline within physics), authors are hard pressed to come up with original ideas to give at each conference. Thus, they may want to write it up once (in a full-fledged journal format) instead of the multiple times they give the talk at different conferences. (In the course of analyzing citations for this paper, I came across a few preprints that indicated they were texts of talks given at more than one conference.) Since conference proceedings often have strict length limitations, authors may find the resulting publication is not what they want to widely distribute, but would rather point people to a more complete, journal-like publication of their results. Also, since conference presentations are meant to be more cutting-edge, less fully formed, and more open to change by feedback from readers, authors may not want to have their proceedings placed indelibly on the preprint server, but

may rather wait until all the informal feedback is in and create one archival version of their work (a role traditionally filled by the journal article).

In each population, conferences were picked to make sure a sample of different kinds of publications (monograph, serial, commercially published, society published) was represented. No difference was found between commercial and society publishers as to the availability of conference articles on the preprint server. No strong differences between different kinds of publications could be determined, although, looking only at the subject areas with large numbers of conference articles on the preprint server, proceedings published in journals had an average of 24% more articles mirrored at the preprint server than those published as monographs (the means are distinct at the 2-sigma level). This may indicate that the proceedings or conferences published in journals were considered more prestigious and thus worth the effort of posting on the preprint server.

A non-trivial component of the publishing process is the issue of copyright. Aside from a few physics societies, publisher copyright release forms typically ask authors to sign away rights for electronic publication of their work. However, they typically don't put up much fuss when asked for exceptions. Indeed, Elsevier's chemistry preprint server indicates at least one commercial publisher's openness to preprint publication. Publisher policies may have an effect on preprint publishing, but, for example, high-energy theory and experiment conferences studied here were published by the same publishers, and there was a dramatic difference in those subjects' submission rates to the preprint server. It is conceivable that author attitudes toward copyright may explain some of the difference between, for example condensed matter and high-energy submissions, for both articles published in the journal and conference literature, but this author has no evidence one way or the other. There is certainly an underlying attitude in the high-energy community that copyright isn't that important, as embodied by Paul Ginsparg's musing that if publishers asked authors to remove articles from his archives, "this would of course be suicidal...since any publisher would lose all future submissions."¹⁵

Conclusion:

Despite the widespread use by physicists of preprint servers to disseminate the information mirrored in the journal literature, this phenomenon has not extended to the conference literature to nearly the same degree. Aside from the high-energy theory community, there is almost no use of the Los Alamos preprint server to disseminate conference proceedings. This raises questions as to motivation of authors to publicize their proceedings, as many authors who didn't submit proceedings articles had submitted journal articles to the preprint server. In particular the lack of proceedings publication by high-energy experimentalists and astrophysicists was intriguing, in that these are groups that traditionally have communicated extensively via preprints. Scientists have also, basically, not taken advantage of conference web sites to serve as stand-alone proceedings sites, although the creation of eConf (which hosts both experimental and theoretical high-energy physics conference proceedings) and the policies of ChemWeb certainly provide encouragement that the scientific community is starting to see the value of electronic publishing of conference proceedings. Currently, however, there is little help for the librarian in search of proceedings on the Internet.

Table 1: Mean number of conference proceedings papers (out of ten) that were available on the Los Alamos preprint server, and the number of conference web sites that included an online proceedings.

Subject Area	Mean	Std Dev of the Means	# Web Sites
String Theory	8.0	0.6	1
Phenomenology	7.2	1.2	0
High Energy Theory	6.5	1.0	0
High Energy Experiment	0.0	0.0	0
Astrophysics	2.4	1.2	0
Superconductivity	0.4	.40	0
Liquid Crystals	0.0	0.0	0

¹Sir Michael Berry, "What's wrong with all these conference proceedings?" *Physics World* 4, no. 7 (1991): 12-13.

² See, for example, Nicholas G. Tomaiuolo and Joan G. Packer, "Preprint Servers: Pushing the Envelope of Electronic Scholarly Publishing," *Searcher* 8, no. 9 (2000): 53-61, for a list of preprint servers in physics, chemistry, mathematics, medicine, social sciences, computer science, and religion and philosophy.

³ Mark Doyle, Manager, Product Development, American Physical Society, personal communication (Jan. 19, 2001).

⁴ James Langer, "Physicists in the New Era of Electronic Publishing." *Physics Today* (August 2000): 35-38.

⁵ M. Cheyney, P. Gloor, D.B., Johnson, F. Makedon, J. Matthews, and P. Metaxas, "Conference on a Disk," in *Proceedings of ED-MEDIA 93—World Conference on Educational Multimedia and Hypermedia*, Vancouver, BC, Canada, June 25-30, 1994. (Charlottesville, VA: Association for the Advancement of Computing in Education, 1994): 129-134.

⁶Robert S. Allen, 1995, "The Magnitude of Conference Proceedings Published in Physics Journals." *Special Libraries*, 86 (Spring 1995): 136-144.

⁷ H. H. Barschall and Haerberli, W., 1992, "Conference Proceedings in Physics." *College & Research Libraries*, 53, no. 6 (November 1992): 563-566.

⁸"Monograph and Serial Costs in ARL Libraries, 1986-1999", Association of Research Libraries www.arl.org/stats/arlstat/1999t2.html. Viewed 1-02-01.

⁹ J. K. Rowley, "The Conference Literature – Savory or Acrid?" in *Proceedings of the Workshop on Conference Literature in Science and Technology*, May 1-3, 1980. (Marlton, NJ: Learned Information, Inc., 1980).

¹⁰ "eConf: Electronic Conference Proceedings Archive" <http://www.slac.stanford.edu/econf/>.

¹¹ "The Chemistry Preprint Server – Conference Proceedings" <http://www.chemweb.com/docs/cps/conference.shtml>> Viewed 1-3-01.

¹² STRINGS '99, <<http://strings99.aei-potsdam.mpg.de/>> Contains audio and overheads from all speakers.

¹³ Gregory K. Youngen, "Citation Patterns to Traditional and Electronic Preprints in the Published Literature." *College & Research Libraries* 59, no. 5 (September 1998): 448-456.

¹⁴ Berry, "What's wrong".

¹⁵ Paul Ginsparg, quoted in Edward Lim, "Preprint Servers: A New Model for Scholarly Publishing." *Australian Academic and Research Libraries* 27 (1996): 21-30.