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Physics journals and their electronic version: a comparison

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Abstract

The comparison between electronic and print journals is a very present problem, and it is not always simple to interpret in the right way the demands of our users in order to find the most appropriate tools to satisfy them. In his study, Enrico Martellini analyses the most important characteristics of electronic and print journals using the physics journals of the library of the Scuola Normale Superiore di Pisa. The study analyses in particular the contents and the full-text standard formats of e-journals, the number of back years available in electronic version, the search tools and additional services that e-journals offer, the timeliness of publication and the possible use of the data contained in the e-journals. These data are compared with those pertinent to the print journals.

1. Introduction

The following pages are inspired by a contribution produced by Aditi Bandyopadhyay and Heting Chu at the 20th Annual national online meeting [1], having as main purpose to determine the elements useful for making a comparison between electronic and print journals.

This evaluation and the selection between these two kinds of resource are, for libraries, a very actual problem: in the period of transition in which we are living it isn't always simple to interpret in the right way the demands of our users and to find the most appropriate tools to satisfy them.

Electronic journals are an indispensable means for the transmission of knowledge but have not yet properly affirmed themselves and have characteristics that are not completely defined; and librarians, having to reconcile the demands of the users with the budget of the library, need more and more objective elements of evaluation that give them the possibility of underlining the qualities and deficiencies of this kind of publication. Otherwise the risk is to accept as unquestionable truth opinions that in fact need to be checked: it is true, for example, that electronic journals offer more timeliness in their publication, but it is useful to quantify it; it is also known that electronic journals offer search tools that go beyond simple index browsing, but in a way that can change from one publisher to another; it is clear that access to articles published in an electronic journal is simpler than that to articles published in a print journal, but this is not always the case.

On the basis of these observations we analysed the most important characteristics of electronic and print journals, using the physics journals at the library of the Scuola Normale Superiore di Pisa.

We took into consideration 54 titles freely accessible in their electronic version [2] to the subscribers to the print edition. This is, of course, a limited sample, but we think it is sufficient to give an idea of what we can obtain from this kind of publication.

Twelve publishers of physics e-journals were taken into consideration in this study: American Institute of Physics (13 titles), American Physical Society (6 titles), Blackwell (1 title), Cambridge University Press (2 titles), EDP Sciences (6 titles), Elsevier (8 titles), Institute of Physics (8 titles), Royal Swedish Academy of Sciences (1 title), Società Italiana di Fisica (2 titles), Springer (3 titles), University of Chicago Press (3 titles), Wiley (1 title).

2. Contents

The first data that we compared are those pertinent to the contents: we analysed whether the electronic version contains the same number, or fewer, or more articles in comparison with the paper edition. In fact, according to the requests and the observations made by our users,we verified that the most important requirement for e-journals is to offer in the electronic edition everything that is published on paper; the remainder (additional services, possibilities of more sophisticated searches, etc.) is usually considered of less importance: "*[users'] requirements for functionality are simple: the ability to search and browse easily, identify a relevant article, and print it out. Most other features, like alerting services, saving references, and customizing the service to the user's personal requirements are considered nice to have rather than essential*".[3]

From our research we found a perfect correspondence between what is published in the electronic edition and what is published in the paper edition; also the *errata* are published in a subsequent issue, exactly as happens for the print version, without correcting the mistakes at the origin. One of the main peculiarities of the digital world is, in fact, the possibility of correcting or modifying what has already been published, but this possibility can cause some differences between the print publication, that is unchangeable, and the electronic version, causing problems for the philology of the electronic text.

We would expect, in the case of the *errata*, a link that leads the reader from the wrong text to the correct version.

The full text of the articles is available in different formats according to the publishing house or, within the same publishing house, according to the publication:

Publisher	Full text standard formats	Number of journals
American Institute of Physics	HTML, Sectioned HTML, PDF, Gzipped PS	2
	PDF, Gzipped PS	11
American Physical Society	PDF, Gzipped PS (recent issues); Page images (GIF), PDF, ASCII Text (old issues)	5
	PDF, Gzipped PS	1

Blackwell	HTML, PDF	1
Cambridge University Press	PDF	2
EDP Sciences	HTML, PDF, PS	2
	PDF	4
Elsevier	PDF	8
Institute of Physics	PDF, PS	4
	PDF, PS, HTML	4
Royal Swedish Academy of Sciences	PDF	1
Società Italiana di Fisica	PS, Gzip, PDF	2
Springer	HTML, PDF, PS	1
	PDF	2
University of Chicago Press	PDF, PS	3
Wiley	PDF	1

It is relevant that most of the publishers we took into consideration offer their articles in PDF, followed by a HTML or PS version; it seems that, nowadays, the Portable Document Format is the most common format for this kind of publication.

3. Back Years

Another aspect of great importance that we analysed is how many back years are available in the electronic version: if we have to opt for online access, it is important to have at our disposal a great number of back years, as well as the steady archiving by the publishers of what is currently published. The data, in this case, are temporary, because the publishers could give access to new years at any time. In June 2000, at the time of our study, we found the following situation.

Publisher	Available years	Number of journals
American Institute of Physics	1985-	1
	1994-	1
	1995-	2
	1996-	1
	1997-	6
	2000-	2
American Physical Society	1985-	4
	1993-	1

	1997-	1
Blackwell	1998-	1
Cambridge University Press	1997-	2
EDP Sciences	1995-	1
	1996-	1
	1998-	4
Elsevier	1994-	1
	1996-	1
	1997-	1
	1998-	5
Institute of Physics	1993-	8
Royal Swedish Academy of Sciences	1997-	1
Società italiana di fisica	1997-	2
Springer	1996-	2
	1997-	1
University of Chicago Press	1995-	1
	1996-	2
Wiley	1998-	1

Summing up, five journals are available from 1985, nine from 1993, two from 1994, four from 1995, seven from 1996, fourteen from 1997, eleven from 1998, two from 2000.

Considering that, according to the needs expressed by our users, the core of the issues necessary for their studies and research is constituted by the last ten-fifteen years, the availability of back years is for the most part inadequate.

4. Search Tools

The search tools that the e-journals offer to the readers are another important improvement in comparison with the print version: people consulting an e-journal, in fact, not only have the possibility to browse the indexes (ToC) of what has been published, but can also use a Boolean search as well as several filters (author, title, abstract, publication year, volume number, etc.), executing the search query across several journals at the same time if that possibility is offered.

We verified the offer of each publisher analysed in our study; typically they provide two possibilities, browsing and searching, but each publisher is characterized by some peculiarities, as we can see in the following.

American Institute	• ***Browse***:

of Physics	• current issue; • all online issues • ***Search:*** (current issue, all online issues, all abstracts, abstracts of forthcoming articles); it is divided into: • simple search (that uses the Boolean search and other possibilities as search by year, month, day, volume, issue; it is possible to sort the results of the search by order of relevance, reverse chronological order and journal/volume/issue/page order); • author search; • advanced search; • search SPIN web (that "*contains the abstracts of over 80 scientific journals published by American Institute of Physics and its member societies since 1975, as well as selected articles from other scientific journals*")
American Physical Society	• ***Browse***: • recent and future issues; • available volumes; • ***Search***: it is possible: • to retrieve a particular article by volume and page number, or by article number; • quick search: (for the issues published after 1997) it allows users to search by word in different fields and to sort the results by inverted chronology, relevance or journal/volume/issue/page; • full text search: (for the issues published between 1985 and 1996) it allows users to search by word and to sort the results chronologically; • full recent volumes search: users "*may choose from the journals and years [listed] to execute [their] search query across other Physical Review journals. Selecting a journal (or journals) but not selecting a year will result in a search across all available years*"; • Full PROLA search: users may "*choose journals and years: (Not choosing a journal or a year will search all journals and all years.)*"
Blackwell	• ***Browse*** • ***Search***: allows users to search by word, selecting the following fields: journal, article title, author(s), keyword(s), year, volume, issue
Cambridge Univ. Press	• ***Browse*** • ***Search***: by word, it is divided into simple and advanced; users may select the following fields: journal, full text, article title, author(s), abstract, affiliation, keyword(s)

EDP Sciences	• ***Browse*** (also for forthcoming papers); • ***Search***: by keyword (Boolean search)
Elsevier	Elsevier Science, Nuclear Physics electronic or Condensed Matter web offer slightly different search possibilities: • ***ElsevierScience*** • ***Browse***: general index of every issue, author index and keyword index; • ***Search***: by word; users may select the fields for their search; • ***Nuclear Physics electronic*** • ***Browse***: general index of every issue and author index; • ***Search***: by word; users may select the fields for their search; • ***Condensed Matter web*** • ***Browse***: general index of every issue, author index and keyword index; • ***Search***: by word; users may select the fields for their search;
Institute of Physics	• ***Browse***: • journal archive; • latest issue; • next issue (partial); • forthcoming articles; • ***Search***: Boolean search by journal, title, author, abstract, affiliation, year, volume, issue; search results can be sorted by date or by relevance;
Royal Swedish Academy of Sciences	• ***Browse*** • ***Search***: by word
Società italiana difisica	Only ***browse***
Springer	• ***Browse*** • ***Search***: • LINK easy search (Boolean search); • LINK expert search: bibliographic search, that searches in defined bibliographic fields; command line search ("*write your own search string to search in defined bibliographic fields using brackets and regular expressions*"); full text search, that searches in all the article, using Boolean operators; search by DOI (Digital Object Identifiers); • LINK site search ("*search in LINK information and service documents*")
University of Chicago Press	• ***Browse***: current issue, all the available issues or future

	articles • ***Search***: • Find an article by exact volume and page; • String search (Boolean search, searches the full text or do field-based searches)
Wiley	• ***Browse*** • ***Search***: • users may create a personal home page "*to store links and customized search protocols for personal use*"; this page includes: • hot journals: "*build your own list of the Wiley journals that most interest you and call up the table of contents from the most recent issue instantly*"; • hot articles: "*allows you to "bookmark" specific articles within any available Wiley journal and call up its abstract with one click*"; • saved queries: "*when you run a search, you may save all the parameters of that search*"; • the following journal searches are possible: • simple search: "*search the words or phrases in all fields (restrict to: all journals, hot journals, journals in subject category)*"; search results can be sorted by date or by relevance; • advanced search: "*select the desired fields*" (article title, authors, author affiliation) "*and enter your search terms*"; search results can be sorted by date or by relevance; search can be limited by date.

5. Additional Services

Besides the above-mentioned searching modes, publishers often offer additional services in order to improve the product, but also to give it a wider appeal. These services are absolute innovations in comparison with the print version and offer very useful tools to the reader, but probably they are not appreciated in the right way yet: our impression is that electronic journals are used according to the criteria used for the paper journals, and that not all their possibilities are exploited.

Among the additional services that we found during our study, the following are the most important:

- **AIP/APS**: from the references, different kinds of links are available: citation links ("*links where the actual citation is a hyperlink are linked to OJPS or other journal abstract view*"); SPIN (Searchable Physics Information Notices, "*provides the most current indexing and abstracting of major American and Russian physics and astronomy journals. SPIN contains abstracts of over 80 scientific journals published by the American Institute of Physics and its member societies since 1975, as well as selected articles from other scientific journals*"); INSPEC, LANL, MEDLINE, SPIRES (external linking ("*provides* databases); EPAPS (the

electronic version of AIP's Physics Auxiliary Publication Service, or PAPS); ISI database reference *researchers with navigational tools to find new and retrospective information*").

- **Blackwell**: member of CrossRef, "*a service that will link reference citations to the online content that those references cite, typically located on a different server and published by a different publisher; registered users can receive tables of contents by e-mail for free*".
- **Cambridge University Press**: an e-mail alerting service is available: "*the Cambridge Journals Online service can automatically e-mail you with details of new issues and/or results of a specified search on a regular basis*".
- **EDP Sciences**: the following are available: links from the references to ADS Astronomy Abstract Service (with the abstract of the article); links to the abstracts of other articles; EDP Sciences Inquiry System ("*a service designed to help editors, authors and referees follow the status of manuscripts submitted to EDP Sciences journals*"); Electronic-only material ("*designed to provide supplementary information that is either too voluminous for printing or that is designed specifically for the web, such as animated images*").
- **Elsevier**: the following are available: PACS (Physics and Astronomy Classification Scheme, "*designed to assist in the retrieval of information*"); alerting service; contents-alert ("*a service which delivers through e-mail the tables of contents of a selected group of journals*"); most-consulted papers.
- **IOP**: the following are available: related links (links to e-journals or web sites dealing with a subject similar to the one of the journal we are consulting); multimedia enhancements; HyperCite™ ("*which links article citations to their corresponding abstracts from the INSPEC database and, where available, to the full text articles*").
- **Royal Swedish Academy of Sciences**: the following are available: PACS no. and subject; a link to *General physics resources and information* where we can find: Physics institutions and resources by country, Other on-line physics resources and Forthcoming physics conferences.
- **Società Italiana di Fisica**: it does not offer particular additional services.
- **Springer**: the following are available: links from the references to NASA ADS (Astrophysics Data System, with access to "*similar abstracts, full refereed scanned article, reference link, citation links*", etc.): LINK alert ("*to receive the table of contents of any journal that interests you as soon as it is retrievable via LINK").*
- **University of Chicago Press**: links to NASA ADS.
- **Wiley**: starting from the abstract, users can "*find other articles like this in Wiley InterScience*" and "*find articles in Wiley InterScience written by any of the authors*"; as we have already said, it is possible to create a personal homepage that "*enables registered users to store links and customized search protocols for their personal use*".

6. Timeliness

One of the advantages of e-journals in comparison with print journals is the possibility of a greater timeliness of publication. This is a topic on which the critics argued a lot, pointing out some possible future developments that could change the nature itself of e-journals: having the possibility of publishing every single article as soon as it is accepted, without having to wait for the completion of the whole issue, the electronic journals could lose their seriality and become a database of articles no longer divided in issues and with a continuous updating.

Nevertheless, up until now the e-journals that we took into consideration have kept the same structure as their print version, offering the advantage of a big advance in the publication time.

From a title-by-title comparison between the most recent issue available in electronic version and the most recent issue of the corresponding paper edition arriving at our library (made on June 13th, 2000) we found the following situation: an absolute equality in 12 cases; one issue more in the electronic version in 22 cases; two issues more in the electronic version in 8 cases; three issues more in the electronic version in 8 cases; four issues more in the electronic version in 3 cases; eight issues more in the electronic version in 1 case. It is important also to underline that in some cases it is possible now to consult electronically some of the articles that will be published in forthcoming issues.

7. Disadvantages of Electronic Journals

We have also to point out the disadvantages of electronic journals in comparison with their print version: in particular, we refer to the clauses contained in the licences that publishers propose/impose to/on the subscribers, from which depends the possible use of the data contained in the e-journals, and that are not always advantageous as compared with the copyright laws that regulate the possible use of print journals.

The case histories change from a total absence of terms and conditions of use by the Società Italiana di Fisica, to the conciseness of the Royal Swedish Academy of Sciences ("*the use of any information supplied is limited to viewing, downloading for temporary storage and printing by authorised users*"), to the meticulous description of terms and conditions prepared carefully by most of the other publishers, that analyse in all details the various *permitted uses* and *prohibited uses*.

The greatest problems, in these cases, come from the comprehension of the terms, not always simple; from the lack of uniformity of the clauses, that can change considerably from one publisher to the other; from the real possibility to let the users know the permitted uses and the prohibited uses; and from the responsibility of the libraries for the violations committed by their users.

Particularly penalizing is the prohibition, that some publishers impose on libraries, from transmitting to other libraries by way of ILL/DD the articles published electronically. The Institutional user licence of the AIP asserts: "*systematic or programmatic downloading …, service bureau redistribution services, printing for fee-for-service purposes and/or systematic making of print or electronic copies for transmission to non-subscribers or non-subscribing institutions (such as in interlibrary loan) are prohibited*"; according to the American Physical Society licence "*such copies [of the output of any search] may not be sold and may not be distributed to anyone who is not a subscriber*"; Blackwell enables users to transmit the articles, on condition that they are printed, only to the authorized users; according to Cambridge University Press licence "*users are not permitted to … transmit any part of the Materials by any means to any unauthorised user*"; EDP

Sciences allows one to make "*one hard copy of the output of any search; such copies may be shared with nonauthorized users to the same extent as the print edition, provided such sharing is for the purpose of scholarly communication or educational use and there are no commercial benefits*"; Elsevier drastically leaves out the transmission of the materials: "*you or your organization agree that any other uses, and specifically renting, re-distributing, re-transmitting, sub-leasing, assigning, … , are prohibited, and that you will not make the products or services available to non-authorized persons*"; IOP consents to the ILL: "*no text accessed via the Service may be available to non-authorized users … except to the extent that a single paper copy of an electronic original or of a print edition could be made so available by way of inter-library loan …*"; the Royal Swedish Academy of Sciences, as we have already seen, allows only "*viewing, downloading for temporary storage and printing by authorised users*"; the Società Italiana di Fisica does not provide for terms and conditions of use; Springer does not permit "*the transfer of the data in whole or in part … as well as granting access to the stored data to third parties*"; according to the University of Chicago Press "*a user may transmit a hard copy or electronic copy of an article to any individual who is not an authorized user under this license provided such transmission is (i) not for compensation, (ii) for purposes of scholarly exchange of ideas, and (iii) not part of any systematic provision of journal content to such user or persons affiliated with such user*"; according to Wiley "*authorized users may transmit to a third-party colleague in hard copy or electronically a single article or item from Wiley InterScience for personal use or scholarly, educational or scientific research or professional use but not for re-sale*".

8. Ease of Access and Management

Our last comment concerns the ease of access to and management of electronic journals.

In all the cases that we took into consideration access is based on IP address recognition, and it is guaranteed as long as the subscription to the paper edition continues (the only exception is the Società Italiana di Fisica, that asks for a new registration every year): when the librarian has registered the library for access, users can consult the e-journals they are interested in with a simple click, without username and password. The differences concern the regularity of the service, the frequency of its possible interruption and the quality of the assistance that is offered by the publisher.

In consideration of the importance of e-journals as a fundamental tool for physics scholars, we can easily imagine the damage (and the consequent disappointment) that breaks in access to the full text cause to our users; and in fact it is difficult to accept the idea to have at hand (or, better, at a click) the article that we need without being able to get it.

Therefore we need to verify which are the real causes of these troubles, with what frequency they affect our libraries, if they are uniformly distributed among the various publishers, and what we can do to improve the situation.

According to our experience (supported by the exchange of opinions with several colleagues of other Italian and foreign libraries) the regularity of the service is normally very good; the only exception is represented by the e-journals of the American Institute of Physics and the American Physical Society, that very often suffer groundless access interruptions. [4]

We tried to identify the most frequent causes of this problem; essentially they are:

- the publisher cannot find any trace of the payment (for example, the cheque has been lost); in this case not only is the access to the electronic version interrupted, but also the dispatch of the paper issues is suspended;

- the publisher is unable to link the library that paid for the paper edition to the library that asks for the online access;
- the communications among the different departments of the publisher are difficult, so that the news that the payment has been made isn't transmitted from the accounting department to the one that takes care of the technical aspects;
- owing to a change of subscription agent, the publisher is unable to link the library that discontinued the subscription through agent X to the library that subscribed to the same journal through agent Y;
- the publisher prepared a new agreement, but the library didn't receive any copy of it.

To make this situation worse, other problems that makethe librarian's job more and more difficult include:

- the publisher often interrupts access to the full text without any warning, not allowing the library to clarify the causes of the miscarriage;
- the time needed for the reopening of the service is sometimes very long, as it takes whole days to verify the payment and weeks for the real reactivation;
- the publisher's answer often takes a long time: also if the problem is extremely urgent, the publisher waits days, and sometimes weeks, before sending an answer;
- the answers are not always relevant, nor do all the questions have a suitable answer;
- the librarian often receives answers or communications from different persons who, even if belonging to the same office, sometimes give the impression of a non-homogeneous behaviour.

All these facts can have as a consequence the cancellation of all the advantages that the electronic journals offer: without the guarantee of uninterrupted access, and of opportune and effective assistance by the publisher, consulting an e-journal can become a frustrating and disadvantageous experience.

These problems, together with those not yet solved of archiving, of access to the full text after cancellation of the subscription, of terms and conditions of use imposed by the publishers through the licences, and of the dislike that some users feel towards electronic resources, remain open and limit the complete success of e-journals also within those subjects, such as physics, that are particularly attracted by the advantages that e-journals offer; librarians and publishersmust co-operate in solving them, in order to favour not only the interests of the scholars, but also their own.

References and notes

[1] Aditi Bandyopadhyay, Heting Chu, *Electronic journals versus print journals: an evaluation framework*, in *National online meeting proceedings 1999: proceedings of the 20th National online meeting, New York, May 18-20, 1999*, Medford, Information Today, c1999.

[2] The journals are: *Applied Physics Letters; Astronomy and Astrophysics; Astronomy and Astrophysics Review; Astronomy and Astrophysics. Supplement Series; Astronomy Reports; Astrophysical Journal; Astrophysical Journal. Letters; Astrophysical Journal. Supplement Series; Classical and Quantum Gravity; Communications in Mathematical Physics; Computer Physics Communications; European Physical Journal. Applied Physics; European Physical Journal. B, Condensed Matter; European Physical Journal. C, Particles and Fields; European Physical Journal. D, Atoms, Molecules and Clusters; Europhysics Letters; Fortschritte der Physik; JETP Letters; Journal of Applied Physics; Journal of Experimental and Theoretical Physics; Journal of Fluid Mechanics; Journal of Mathematical Physics; Journal of Physics. A, Mathematical and*

General; Journal of Physics. B, Atomic and Molecular Physics; Journal of Physics. Condensed Matter; Journal of Physics. G, Nuclear and Particle Physics; Journal of Plasma Physics; Journal of Vacuum Science and Technology. A, Vacuum, Surfaces and Films; Journal of Vacuum Science and Technology. B, Microelectronics Processing and Phenomena; Monthly Notices of the Royal Astronomical Society; Nuclear Physics. A; Nuclear Physics. B; Il Nuovo Cimento. B; Il Nuovo Cimento. C; Physica. E, Low-dimensional Systems and Nanostructures; Physica Scripta; Physical Review. A; Physical Review. B; Physical Review. C; Physical Review. D; Physical Review. E; Physical Review Letters; Physics of Fluids; Physics Letters. A; Physics Letters. B; Physics of Plasmas; Physics Reports; Plasma Physics and Controlled Fusion; PlasmaPhysics Reports; Reports on Progress in Physics; Reviews of Modern Physics; Semiconductor Science and Technology; Semiconductors; Solid State Communications.

The whole list of the e-journals accessible from the domain of Scuola Normale Superiore di Pisa is available at the URL http://biblio.sns.it/ejourn1.htm.

[3] Christine Baldwin, *Electronic journal publishing: meeting user needs*, "IFLA journal", 25 (1999) n.4, p.214.

[4] We hope that these statements, based on our experience at the Library of Scuola Normale Superiore di Pisa, will be considered a constructive criticism, and not a sterile polemic: the electronic journals published by AIP and APS are so important that the solution of these problems would be welcomed by all physicists.

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