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Accelerating access

It's been an eventful few months in moves to make the primary scientific literature 'open-access' — that is, freely available to all online to read, download and reuse without any barriers, charges or restrictions. In October, the Public Library of Science (PLoS), run by a group of top biologists, launched *PLoS Biology*, an open-access journal intended to compete with top-tier journals, and which its founders hope will herald a suite of journals that lift open-access from relative obscurity to mainstream. The UK's Wellcome Trust, one of the world's biggest medical charities, has since agreed to let researchers use grants to cover open-access author charges, and the main research agencies in Germany and other European countries have since followed suit.

Researchers in the physical sciences may be forgiven for looking on with some bewilderment. They have long made papers freely available, before publication, using online preprint archives such as arXiv.org. And the American Physical Society, which publishes *Physical Reviews*, *Physical Review Letters* and *Reviews of Modern Physics*, lets authors publish their papers on such archives and on personal Web pages, effectively making articles freely available to all. Open access has not been an issue.

APS has been experimenting since 1998 with an open-access journal, *Physical Review Special Topics: Accelerators and Beams*, sponsored by laboratories worldwide. Such institutional funding can be difficult to sustain, however.

Take the *Journal of High Energy Physics* (*JHEP*) created in 1997, and since a victim of its own success. Sponsorship from high-energy physics centres couldn't keep pace with growth — from 200 articles published in 1998 to 733 articles last year. To stay in business, and meet its $500,000 annual costs, it turned this year to the UK publisher, the Institute of Physics, to market the title at $900 annually.

PLoS's model instead relies on charging authors a 'dissemination' fee to cover the costs of publishing. It reckons $1,500 per article will do the job. That remains to be seen. Journals that aim to publish only the best research have, by definition, high rejection rates — often over 90% of submitted manuscripts — making editorial costs per published paper high. And the model is not applicable to paying the high costs of extra services offered by those journals that provide extensive added journalistic and other editorial content. Another drawback is that 'author pays' is a poor tool for generating the large capital investments needed to invest in new journals and editorial and Web services, which often take years to break even.

Physical scientists have also been reluctant to pay author charges in the past. But *The New Journal of Physics*, an open-access journal launched in 1998 by the UK Institute of Physics and the German Physical Society, and which charges $500 per published article, is now thriving. There are as yet few signs in the physical sciences of a groundswell for change, however. The growing support for open-access author charges from grant agencies may change that, and open-access no-frills online papers may eventually compete with many of the low-circulation, high-cost journals that make up much of the literature.

COMMUNICATION OF INFORMATION IS BECOMING INCREASINGLY DYNAMIC AND DEEPLY INTEGRATED INTO THE WORKFLOW OF SCIENTISTS

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NETWORKED WORLD: HOW BEST CAN GLOBAL COMMUNITIES, ORGANIZE, COMMUNICATE AND RETRIEVE INFORMATION?

But access, and indeed papers and journals themselves, are increasingly just part of a broader essential question as to how communities should best organize, communicate and retrieve information. The scientific paper itself has changed surprisingly little in the Web era, and remains largely an electronic facsimile of its print cousin. And most readers still largely use the Web just to find, download and print papers. To see where the Internet has made the greatest impact in the physical sciences, one must look elsewhere.

The challenge of scientific communication is increasingly not only to record the output of individual scientists, but instead to share data and workflows built by global communities, interlinking data, theory and complex computation. September saw the launch by the world's particle physics community of the Large Hadron Collider (LHC) Computing Grid, to handle, share and analyse the avalanche of data that will flow from the LHC of the European Laboratory for Particle Physics (CERN) from 2007 onwards. The Earth System Grid (www.earthsystemgrid.org) and digital sky surveys, are other examples where communication of information is becoming increasingly dynamic and deeply integrated into the workflow of scientists. The exchange and dissemination of information was one of the motivations behind the creation of the Web in the first place. It will be intriguing to see in what diverse ways the Internet's full potential will shape up in the physical sciences.