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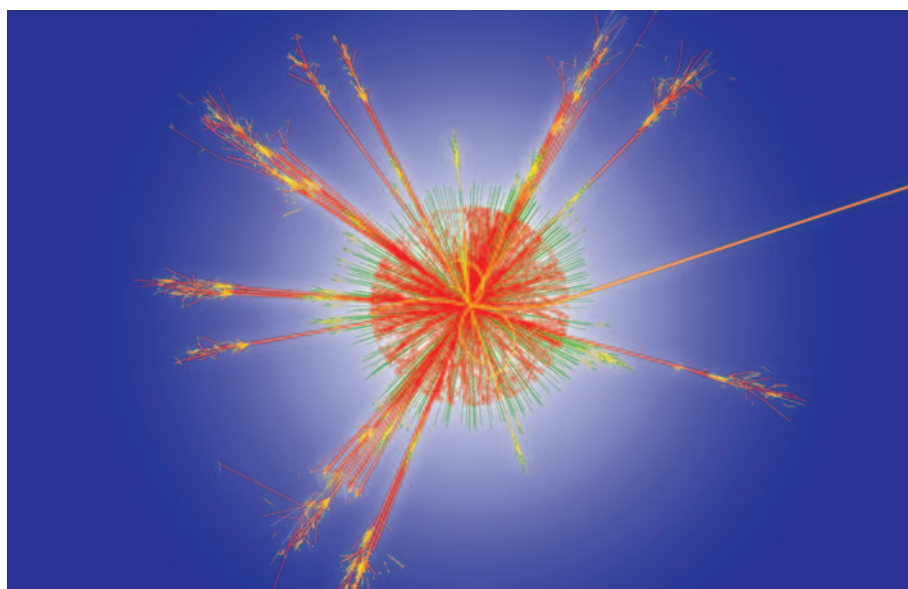
Particle physicists push for publishing changes

The high-energy physics community wants all of its published research to be freely available to everybody. **Jens Vigen** reports on how a radical new initiative hopes to achieve this

Over the last 15 years the high-energy physics (HEP) community has achieved what is known as full green open access. This means that there is a wide dissemination of preprints of HEP articles via arXiv, a central subject repository managed by Cornell University. However, although green open access gives free access to the papers that are written, it does not alleviate the economic difficulties for libraries. They are still expected to offer access to the final published versions of the peer-reviewed literature so they still need to pay for subscriptions.

This is a challenge because the rising costs of journals has forced libraries to cancel an increasing number of subscriptions. What's more, having subscriptions in research libraries does not address the increasing awareness that results of publicly-funded research should be made available to the public. This need is amplified by the transformation of research activities towards 'e-science', carried out by a global scientific community linked by strong networks.

For these reasons, the particle-physics community is now aiming for gold open access. In this model, all the final published versions are freely accessible to everybody at anytime. A working party is now working to bring together funding agencies, laboratories and libraries into a single consortium, called SCOAP3 (Sponsoring Consortium for Open Access Publishing in Particle Physics). This consortium will engage with publishers towards building a sustainable model for open-access publishing.



Simulation of two protons colliding. If SCOAP3's plans are successful then the published results of all such experiments will be available to everybody free of charge. Image courtesy of CERN.

The origins of this initiative go back to December 2005 when a tripartite Task Force, comprising funding agencies, publishers and research organisations, was set up to study the possibilities for open-access (OA) publishing in HEP. Its main conclusion was that a model whereby the costs of publishing were paid globally rather than on an article-by-article basis was the most appropriate.

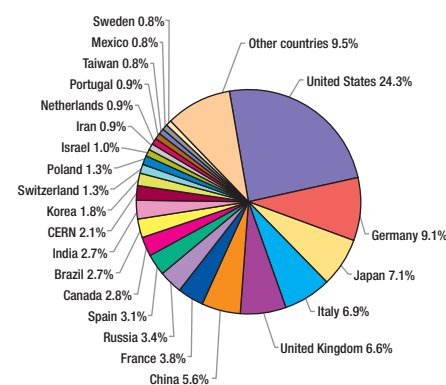
It is interesting to observe that in the past few years all physics publishers have introduced OA options of one kind or another. These moves can clearly be linked to the ongoing vivid debate in the community itself. However, in spite of the fact that 90 per cent of the HEP articles published today in principle could have been published as OA, only a very small fraction of authors actually have the opportunity to choose this option. This is due to the fact that no funding mechanisms so far are put in place to cover the corresponding publication fees.

Motivation from physicists

There is no doubt that the community is motivated to communicate its scientific findings

via OA. The HEP community pioneered OA way before the internet facilitated information exchange as we know it today. For decades physicists shipped manuscripts, which were intended for publication in hundreds of copies, to colleagues around the world for comments prior to publication. These manuscripts were what we now know as preprints. Librarians at CERN, the HEP facility in Switzerland, then came up with the idea of compiling

Figure 1: Distribution of HEP articles by country, average 2005–2006



a catalogue of these documents. This catalogue later turned into a database and eventually into a so-called 'repository' containing collections of preprints freely accessible on the internet.

Today, the main bulk of HEP preprints are available through repositories and the papers can easily be retrieved via services offered by arXiv, the CERN Document Server or SPIRES. Thanks to the speed with which they make results available, repositories have reinforced the role of preprints as the lifeblood of HEP scientific information exchange. This is what the OA movement often refers to as green OA.

However, repositories do not perform peer review and may contain only the original versions of articles submitted to journals, and not necessarily the final, peer-reviewed, published versions. Despite the success of repositories, there is consensus in the scientific community about the need for high-quality journals. These, the community feels, will continue to provide: quality control through the peer-review process; a platform for the evaluation and career evolution of scientists; and a measure of the quality and productivity of research groups and institutes. Making this class of papers available to anyone, anywhere and anytime brings us to what is referred to as gold OA.

The SCOAP3 model

So how will SCOAP3's alternative work? The proposed initiative aims to convert high-quality HEP journals to OA.

In this new model, the publishers' subscription income from multiple institutions is replaced by income from a single financial partner, the 'Sponsoring Consortium for Open Access Publishing in Particle Physics' (SCOAP3). SCOAP3 is a global network of HEP funding agencies, research laboratories, and libraries. Each SCOAP3 partner will recover its contribution from the cancellation of its current journal subscriptions. This model avoids the obvious disadvantage of many current OA models in which authors are directly charged for the OA publication of their articles.

The price of an electronic journal is mainly driven by the costs of running the peer-review system and editorial processing. Most publishers quote a price in the range of 1,000–2,000 euros per published article. On this basis, we estimate that the annual budget for the transition of HEP publishing to OA would amount to a maximum of 10 million euros per year. In comparison, the annual list-price of a single 'core' HEP journal today can be as high as 10,000 euros; for 500

'The large majority of HEP articles are published in just six peer-reviewed journals'

institutes worldwide actively involved in HEP, this represents an annual expenditure of five million Euros – and that is just for one core journal.

The financing and governance of SCOAP3 will follow as much as possible the example of large research collaborations and each country will contribute according to the number of its scientific publications (see figure 1). An allowance of not more than 10 per cent of the SCOAP3 budget is foreseen to cover publications from scientists from countries that cannot be reasonably expected to contribute to the consortium at this time.

In practice, the OA transition will be facilitated by the fact that the large majority of HEP articles are published in just six peer-reviewed journals from four publishers. Five of those six journals carry a majority of HEP content. These are *Physical Review D* (published by the American Physical Society), *Physics Letters B* and *Nuclear Physics B* (Elsevier), *Journal of High Energy Physics* (SISSA/IOP) and the *European Physical Journal C* (Springer).

The aim of the SCOAP3 model is to assist publishers to convert these 'core' HEP journals entirely to OA and it is expected that the vast majority of the SCOAP3 budget will be spent to achieve this target. The sixth journal, *Physical Review Letters* (American Physical Society), is a 'broadband' journal that carries only a small fraction (10 per cent) of HEP content; it is the aim of SCOAP3 to sponsor the conversion to OA of this journal fraction. The same approach can be extended to another 'broadband' journal

CERN director-general, Robert Aymar, received the first financial contribution on behalf of SCOAP3 from vice-rector of the University of Patras, Vassilis Anastassopoulos, at the OA15 workshop held at CERN in April this year.



that is popular with HEP instrumentation articles, *Nuclear Instruments and Methods in Physics Research A* (Elsevier), which has about 25 per cent HEP content. The schema will of course not be limited to the titles listed above; all publishers will be welcome to bid for being included. For new journals, criteria such as profile of the editorial board or the size of the author and reader base will be considered.

HEP has a natural overlap with related fields such as, but not limited to, astroparticle physics and nuclear physics. The five 'core' journals include between 10 per cent and 30 per cent of articles in these disciplines, which will be naturally and logically included in the OA transition. This is in the interest of the readership and promotes the long-term goal of an extension of the SCOAP3 model to these related disciplines. The fractions of 'broadband' journals quoted above also include publications in these related disciplines.

The annual budget for the SCOAP3 operation will be established through a tendering procedure. The tender and the subsequent contracts with publishers will address the use of OA articles, the conditions for un-bundling OA journals from existing subscription packages, and the reduction of subscription prices for 'broadband' journals following the conversion of a fraction of articles to OA. Provided that the SCOAP3 funding partners are ready to engage in long-term commitments, many publishers are expected to be ready to enter into negotiations along the lines proposed here.

When will it happen?

Leading funding agencies and library consortia are currently signing an Expression of Interest for the financial backing of the consortium. Once sufficient momentum is gained, the tendering procedure will take place determining the exact budget envelope. A Memorandum of Understanding detailing the financial contribution of each country and the governance of SCOAP3 will then be signed. Contracts will then be established with publishers in order to make OA publishing in high-energy physics a reality in 2008.

The example of SCOAP3 will be a milestone in the history of scientific publishing. It could rapidly be followed by other disciplines, particularly in related fields such as nuclear physics or astro-particle physics.

Jens Vigen is head of the library at CERN, which is one of the members of SCOAP3