Open Access Publishing in High-Energy Physics

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• HEP & OA: a synergy
• The SCOAP$^3$ model
• Financial aspects
• Conclusions & outlook

http://cern.ch/oa/Scoap3WPRReport.pdf
High-Energy Physics (or Particle Physics)

HEP aims to understand how our Universe works:
- by discovering the most elementary constituents of matter and energy
- by probing their interactions
- by exploring the basic nature of space and time

In other words, try to answer two eternal questions:
- "What is the world made of?"
- "What holds it together?"

Build the largest scientific instruments ever to reach energy densities close to the Big Bang; write theories to predict and describe the observed phenomena.
Lo Standard Model – Paradigma della Fisica Moderna

molecole  
  ↓  
atomi  
  ↓  
Protoni, neutroni, elettroni  
  ↓  
Quark, leptoni

L’ipotesi base dello SM è che per descrivere la natura siano necessari e sufficienti: i quark \([u,d,s,c,b,t]\) e i leptoni \([e,\mu,\tau,\nu_e,\nu_\mu,\nu_\tau]\) organizzati in tre “famiglie”, i mediatori delle interazioni (gravitone ?), ed il bosone di Higgs (?).
INFN oggi

19 Sezioni
11 Gruppi collegati
4 Laboratori Nazionali
Laboratori Nazionali di Frascati

- NAUTILUS: antenna onde gravitazionali
- DAFNE: luce di sincrotrone
- KLOE, FINUDA, DEAR: esperimenti di fisica nucleare e subnucleare
- BTF: test di rivelatori

350 dipendenti (50% tecnici, 40% ricercatori)
250 utenti esterni (15% stranieri)
350 dipendenti (50% tecnici, 40% ricercatori)
250 utenti esterni (15% stranieri)
CERN: European Organisation for Nuclear Research (since 1954)

- The world leading HEP laboratory, Geneva (CH)
- 2500 staff, 8000 users
- 3 Nobel prizes
- Invented the web
- Completing the 27-km (6000 M€) LHC accelerator

The CERN Convention (1953) contains what is effectively an early Open Access manifesto:

“... the results of its experimental and theoretical work shall be published or otherwise made generally available”
OA & HEP: a synergy
The unique situation of HEP

- HEP is decades ahead in thinking Open Access:
  - Mountains of paper preprint shipped all over the world by HEP institutes for 40 years (at author/institute expenses!)
  - HEP launched arXiv (1991), the archetypal Open Archive
  - The first free peer-reviewed electronic journals:

- Small and connected community (<15000 scientists)
- Small scientific output (<10000 articles)
- Small publishing landscape (< 10 journals)
- Reader and author communities largely overlap
- Green OA is second nature: posting on arXiv before even submitting to a journal is common practice.
  - No mandate, no debate. Author-driven. Evident benefits
The HEP publishing landscape

5016 articles submitted to arXiv:hep in 2005 and published in peer-reviewed journals

90% of articles are in theory and by less than 3 authors
83% of articles published in 6 leading journals
87% of articles published by four publishers
57% of articles by not-for-profit (nor-for-loss) publishers

HEP and its journals

- Journals (with their vaguely anachronistic page and figure limits) are on the way to lose (lost?) a century-old role as vehicle of scholarly communication.
- Still, evaluation of institutes and (young) researchers is based on high-quality peer-reviewed journals.
- The main role of journals is to assure high-quality peer-review and act as keepers-of-the-records.
- The HEP community needs high-quality journals.
- Implicitly, the HEP community supports this role by purchasing subscriptions, as it reads off arXiv anyhow.
- As an “all-arXiv discipline” HEP is at high risk to see its journal canceled by large multidisciplinary university libraries (when not already happened).
HEP and Open Access

After arXiv and the web, Open Access journals are the natural evolution of HEP scholarly communication
Is it all about vocal librarians?
Strong support from the LHC collaborations

"We, the _*_ Collaboration, strongly encourage the usage of electronic publishing methods for _*_* publications and support the principles of Open Access Publishing, which includes granting free access of our _*_* publications to all. Furthermore, we encourage all _*_* members to publish papers in easily accessible journals, following the principles of the Open Access Paradigm."

5400 scientists building the largest scientific instruments ever

\[
\begin{align*}
\text{ATLAS; approved on 23rd February 2007} \\
\text{CMS; approved on 2nd March 2007} \\
\text{ALICE; approved on 9th March 2007} \\
\text{LHCb; approved on 12th March 2007}
\end{align*}
\]
Current Models of OA publishing in HEP (I)

**Author-pays:** all content of the journal is free to read. After acceptance, authors pay journals for processing fees.
- *New Journal of Physics* (IOP) since 1998, but attracted only a small HEP fraction, with 20 articles/year
- Limited success due to lack of paying mechanisms?
- Tried again by PhysMathCentral *Physics A*, a new HEP journal now accepting submissions (spin off of BioMedCentral)

**Hybrid model:** authors can pay journals to make their articles free to read. The rest of the journal is still behind subscription gates. Offered by all leading publishers.
- Prices range from 750€ to 3,000€.
- Negligible success, lack of funding mechanisms?
- Why pay for something you can get for free?
- Why paying twice with OA charges on top of subscription fees?
Current Models of OA publishing in HEP (II)

**Sponsoring model:** institutions fund journals. No author charges. All content free to read.
- *Physical Review Special Topics Accelerators and Beams (APS)* since 1998
- “Niche” journal with ~150 article/year and budget ~150’000$/year
- 11 labs worldwide. Longest (only?) success story in HEP OA.
- Is it scalable?

**Institutional membership:** institutions who wish to do so pay premium subscriptions proportional to their output and articles with at least one affiliated authors are OA.
- Well received by labs and OA-aware authors (who can publish OA without direct costs)
- Is it scalable?
The SCOAP³ model
Sponsoring Consortium for Open Access Publishing in Particle Physics

Towards the SCOAP³ consortium

• Tripartite task force of HEP funding agencies, publishers and authors indicated sponsoring as a way to achieve Open Access publishing in HEP
• European HEP funding agencies, library consortia and the research community charged a Working Party to propose a blueprint for a sponsoring consortium

http://cern.ch/oa/Scoap3WPReport.pdf
SCOAP$^3$ in one line

A consortium sponsors HEP publications and makes them OA by re-directing subscription money.

Today: (funding bodies through) libraries buy journal subscriptions to support the peer-review service and to allow their patrons to read articles.

Tomorrow: funding bodies and libraries contribute to the SCOAP$^3$ consortium, which pays centrally for the peer-review service. Articles are free to read for everyone.

A mix of PRSTAB sponsoring and JHEP/JINST institutional membership, on a world-wide scale
Pillars of the SCOAP$^3$ model (I)

What?

- Online journals free to read for anybody, anywhere, anytime.
- Preserve high-quality peer-review process.
- Generate medium- and long-term savings for libraries and funding agencies by linking price with quality.
- Publishers receive and process articles as they do now, but make the final version available OA (and feed it to a SCOAP$^3$ database, harvested by others) and receive financial compensation by SCOAP$^3$ for this quality-assurance service.
- Publishers continue to meet demand for additional *premium* products to interested libraries and/or authors (paper journals, reprints, color pages, ...).
Pillars of the SCOAP$^3$ model (II)

Who?

- HEP funding agencies and library consortia worldwide.
- Publishers interested in the transition of their journals to OA.
- Achieve OA in a way financially transparent for authors, who have to be nonetheless proactive in their choices of journals.
- Most publishers of high-quality HEP journals are expected to be ready to enter negotiations provided long-term funding is available for SCOAP$^3$. 
Pillars of the SCOAP³ model (III)

How?

• Assist publishers to convert existing high-quality peer-reviewed journals to Open Access.
• Do not ask individual authors/groups to directly pay to publish their articles Open Access.
• No “paying twice” for Open Access and subscriptions.
• Exploit the fact that in HEP the reader and the author communities largely overlap.
• Federate HEP funding agencies and library consortia worldwide.
• Re-direct money used for subscriptions to SCOAP³: a single commercial partner for publishers.
Towards Open Access journals

- Six journals cover 80% of central HEP literature
  - Carry a majority of HEP content
  - 10%-30% Nuclear Physics and Astroparticle Physics
  - Aim to convert them entirely to Open Access
  - Reduce prices of “packages” accordingly
- One “broadband” journal: *Physical Review Letters* (APS)
  - 10% HEP (including Nuclear and Astroparticle Physics)
  - Sponsor the conversion to OA of this fraction
  - Reduce subscription price accordingly
- SCOAP³ is not limited to this initial set of journals but open to all high-quality HEP journals!
Financial aspects
Guesstimating the budget envelope

- *Physical Review D* (APS) operates with 
  2.7M€/year (31% of arXiv:hep)
- *Journal of High Energy Physics* (SISSA/IOP) needs 
  ~1M€/year (19% of arXiv:hep)

**HEP Open Access price tag: 10M€/year**

- A published PRD article costs APS ~1500€
- 6-8 leading journals publish 5000-7000 articles a year
SCOAP$^3$ financing

- SCOAP$^3$ exact yearly cost to be known after a tender is sent to publishers.
- SCOAP$^3$ financing to be distributed according to a “fair-share” model based on the distribution of HEP articles per country, accounting for co-authorship.
- Make an allowance for developing countries who at the beginning might not contribute to the scheme.
- The model is viable only if every country is on board! Allowing only SCOAP$^3$ partners to publish Open Access simply replicates the subscription scheme and does not solve the problems: need to buy/read what others write.
A study of HEP authorship in leading journals

J. Krause, C. M. Lindqvist, S. Mele CERN-OPEN-2007-014

Distribution of HEP articles by country, average 2005-2006

11326 articles

United States 24.3%
Germany 9.1%
Japan 7.1%
Italy 6.9%
United Kingdom 6.6%
China 5.6%
France 3.8%
Spain 3.1%
Canada 2.8%
Brazil 2.7%
CERN 2.1%
Russia 3.4%
Korea 1.8%
Poland 1.3%
Switzerland 1.3%
Israel 1.0%
Iran 0.9%
Portugal 0.9%
Taiwan 0.8%
Mexico 0.8%
Sweden 0.8%
Other Countries 9.5%

All HEP “core” journals and HEP fraction of broadband journals. Co-authorship is taken into account on a pro-rata basis by assigning articles to countries according to their number of authors.
Conclusion & outlook

**SCOAP³ in a nutshell**

- Establish Open Access in HEP publishing in a transparent way for authors.
- Convert existing high-quality peer-reviewed journals to Open Access, in a sustainable way.
- Operate along the blueprint of large scientific collaborations.
- Price tag of 10M€/year to be shared according to the distribution of HEP articles per country.
- The model has high potential but is only viable if every country contributing to HEP is on board!
- SCOAP³ model could be rapidly generalized to related fields: Nuclear and Astroparticle Physics.
Next steps

• Formal proposal published in April.
• Solicit and collect expressions of interest of potential funding partners: HEP funding bodies, national library consortia, large national libraries.
• Funding partners identify country-by-country schemes to re-direct journal subscriptions to SCOAP³.
• Once funding partners commit to sizeable fraction of budget send a tender to publishers and
  - determine final budget;
  - enlist remaining partners.
• Formal agreement to establish SCOAP³.
• Goal: have SCOAP³ operational for the first LHC articles!
Thank you!

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www.lnf.infn.it/library/

Salvatore.Mele@cern.ch

http://cern.ch/oa/Scoap3WPReport.pdf
Una volta partito, SCOAP3 emetterà un bando di gara a tutti i publishers più prestigiosi per contrattare un prezzo/articolo.

L’Infn pagherà la quota HEP Italia (~700k€/anno).

Le sei riviste selezionate saranno OA per tutti.

Nessuno dovrà più pagare gli abbonamenti di queste sei riviste.

L’Infn recupererà la quota versata attraverso i consorzi che applicheranno una quota fair-share alle biblioteche un tempo abbonate alle sei riviste che ora sono Open Access.
Additional material
### Journals candidate for conversion to OA

As from SPIRES, 8500 HEP articles in 2005: 62% in “core” HEP subjects (experiment, phenomenology, field th.) and 38% in related subject (instrument., nuclear physics, astroparticle, ...)

<table>
<thead>
<tr>
<th>Journal</th>
<th>Publisher</th>
<th>IF</th>
<th>Articles</th>
<th>HEP Articles</th>
<th>&quot;Core&quot; HEP</th>
<th>f(HEP)</th>
<th>f(&quot;Core&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys. Rev. D</td>
<td>APS</td>
<td>4.9</td>
<td>2285</td>
<td>2101</td>
<td>1635</td>
<td>72%</td>
<td>92%</td>
</tr>
<tr>
<td>JHEP</td>
<td>SISSA/IOP</td>
<td>5.9</td>
<td>856</td>
<td>856</td>
<td>840</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>Phys. Lett. B</td>
<td>Elsevier</td>
<td>5.3</td>
<td>957</td>
<td>862</td>
<td>740</td>
<td>77%</td>
<td>90%</td>
</tr>
<tr>
<td>Nucl. Phys. B</td>
<td>Elsevier</td>
<td>5.5</td>
<td>522</td>
<td>481</td>
<td>465</td>
<td>89%</td>
<td>92%</td>
</tr>
<tr>
<td>Phys. Rev. Lett.</td>
<td>APS</td>
<td>7.5</td>
<td>3836</td>
<td>407</td>
<td>279</td>
<td>7%</td>
<td>11%</td>
</tr>
<tr>
<td>Eur. Phys. J. C</td>
<td>Springer</td>
<td>3.2</td>
<td>331</td>
<td>272</td>
<td>234</td>
<td>71%</td>
<td>82%</td>
</tr>
<tr>
<td>Mod. Phys. Lett. A</td>
<td>World Scient.</td>
<td>1.3</td>
<td>281</td>
<td>216</td>
<td>138</td>
<td>49%</td>
<td>77%</td>
</tr>
<tr>
<td>Phys. Rev. C</td>
<td>APS</td>
<td>3.6</td>
<td>853</td>
<td>298</td>
<td>136</td>
<td>16%</td>
<td>35%</td>
</tr>
<tr>
<td>Class. Quant. Grav.</td>
<td>IOP</td>
<td>2.9</td>
<td>491</td>
<td>255</td>
<td>89</td>
<td>18%</td>
<td>52%</td>
</tr>
<tr>
<td>Int. J. Mod. Phys. A</td>
<td>WSP</td>
<td>1.5</td>
<td>878</td>
<td>143</td>
<td>88</td>
<td>10%</td>
<td>16%</td>
</tr>
<tr>
<td>J. Math. Phys.</td>
<td>AIP</td>
<td>1.2</td>
<td>446</td>
<td>108</td>
<td>74</td>
<td>17%</td>
<td>24%</td>
</tr>
<tr>
<td>Phys. Atom. Nucl.</td>
<td>Springer</td>
<td>0.9</td>
<td>220</td>
<td>106</td>
<td>72</td>
<td>33%</td>
<td>48%</td>
</tr>
<tr>
<td>J. Phys. A</td>
<td>IOP</td>
<td>1.6</td>
<td>850</td>
<td>78</td>
<td>65</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>Eur. Phys. J. A</td>
<td>Springer</td>
<td>1.7</td>
<td>458</td>
<td>91</td>
<td>58</td>
<td>13%</td>
<td>20%</td>
</tr>
<tr>
<td>JCAP</td>
<td>SISSA/IOP</td>
<td>6.7</td>
<td>156</td>
<td>128</td>
<td>57</td>
<td>37%</td>
<td>82%</td>
</tr>
<tr>
<td>J. Phys. G</td>
<td>IOP</td>
<td>2.2</td>
<td>414</td>
<td>87</td>
<td>55</td>
<td>13%</td>
<td>21%</td>
</tr>
<tr>
<td>Nucl. Instrum. Meth. A</td>
<td>Elsevier</td>
<td>1.2</td>
<td>1371</td>
<td>312</td>
<td>16</td>
<td>1%</td>
<td>23%</td>
</tr>
</tbody>
</table>

80% of articles in “core” HEP subjects in 5-7 journals
Potential initial partners of SCOAP³

- Phys.Rev.D: 31%
- Elsevier: 32%
- APS: 47%
- SISSA/IOP: 15%
- Springer: 6%
- Others (<75): 11%
- Int.J.Mod.Phys.A: 2%
- Class.Quant.Grav.: 2%
- Phys.Rev.C: 3%
- Mod.Phys.Lett.A: 3%
- Eur.Phys.J.C: 4%
- Phys.Rev.Lett.: 5%
- Nucl.Phys.B: 9%
- Phys.Lett.B: 14%
Expansion of OA offers from 2005 to 2007

Published articles by journal OA policy:

had authors wanted, could their articles be published OA?

5015 articles submitted to hep-ex, hep-ph, hep-lat and hep-th in 2005
and subsequently published in peer-reviewed journals

• These articles were NOT OA. Had funding mechanism been in place, they would have been.
• Publishers expand their OA options as a consequence of the debate on OA within the HEP community.
How are you going to put it together?

- 40 funding agencies
- 400 M€ (Excluding person-power)
- 1000 contracts

The ATLAS detector is being completed for the LHC!
SCOAP$^3$ - HEP collaborative experience

- O(50) funding bodies
- 10 M€
- O(10) contracts with publishers

Establish OA publishing by using the blueprint used to finance and build the largest experiments ever!