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1. Introduction

The last two years witnessed an interesting evolution of the publishing landscape in High-Energy Physics, the emergence of Open Access publishing being one of the main events. See the "Further Reading" section for a short bibliography on Open Access projects, projects on preservation of digital information, user behavior studies, and studies on the evolution of the publishing landscape in High-Energy Physics.

[†] Starting with this edition of the Review of Particle Physics, the CERN Scientific Information Service will take over the responsibility to update and maintain this list of selected resources of interest to the particle physics community. We would like to thank our colleagues of the SLAC Research Library, who put together along the years a list of high quality resources, that we integrated and partly reorganized. An extended and updated version of this list is going to be available at:

<http://library.cern.ch/library/pdg/>

Please send comments and corrections to tullio.basaglia@cern.ch.

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2. Particles and Properties Databases

Particle Data Group resources

- REVIEW OF PARTICLE PHYSICS (RPP): A biennial comprehensive review summarizing much of the known data about the field of particle physics produced by the international Particle Data Group (PDG). Includes compilations and evaluation of data on particle properties, summary tables with best values and limits for particle properties, extensive summaries of searches for hypothetical particles, and a long section of reviews, tables, and plots on a wide variety of theoretical and experimental topics of interest to particle physicists and astrophysicists. The Review of Particle Physics online:

<http://pdg.lbl.gov>

- PARTICLE PHYSICS BOOKLET: Although this booklet is produced in print only and has no online access, it is included in this guide because it is one of the most useful summary sets of physics data available. Its small size and ease of ordering from the Particle Data Group make it one of the most useful and frequently used tools for particle physicists. This pocket-sized 300-page booklet contains data abstracted from the most recent edition of the full Review of Particle Physics. Includes summary tables and abbreviated versions of some review articles. Contains useful plots and figures. Order a copy from:

http://pdg.lbl.gov/2009/html/receive_our_products.html

- PDGLive:

<http://pdglive.lbl.gov>

- COMPUTER-READABLE FILES: Currently available from the PDG: Tables of masses, widths, and PDG Monte Carlo particle numbers and cross-section data, including hadronic total and elastic cross sections vs laboratory momenta, and total center-of mass energy. The PDG Monte Carlo particle numbering scheme has been updated for the recent edition of the RPP and is also available as a MobileDB database. These files are updated in even-numbered years coinciding with the production of the *Review of Particle Properties*:

http://pdg.lbl.gov/2009/mcdata/mc_particle_id_contents.html

Other Particles and Properties Databases

- HEPDATA databases at University of Durham/RAL, this database is compiled by the Durham Database Group (UK) with help from the COMPAS Group (Russia). Contains numerical values of HEP reaction data such as total and differential cross sections, fragmentation functions, structure functions, and polarization measurements from a wide range of experiments. Updated at regular intervals. Provides data reviews which contain precompiled reviewed data such as ‘Structure Functions in DIS,’ ‘Single Photon Production in Hadronic Interactions,’ and ‘Drell-Yan Cross Sections.’

<http://durpdg.dur.ac.uk/HEPDATA/REAC>

- NIST PHYSICS LABORATORY: This unit of the National Institute of Standards and Technology provides measurement services and research for electronic, optical, and

radiation technologies. Three sub-pages, on Physical Reference Data, on Constants, Units & Uncertainty, and on Measurements & Calibrations, are extremely useful. Additional links to other physical properties and data of tangential interest to particle physics are also available from this page:

<http://physics.nist.gov/>

3. Open Access Databases (arXiv, SPIRES, INSPIRE, . . .)

- arXiv.org E-PRINT ARCHIVE: The arXiv.org is a repository of full text papers in physics, mathematics, computer, statistics, nonlinear sciences, quantitative finance and quantitative biology. Papers are usually sent by their authors to arXiv in advance of submission to a journal for publication. Primarily covers 1991 to the present but authors are encouraged to post older papers retroactively. Permits searching by author, title, and keyword in abstract. Allows limiting by subfield archive or by date:

<http://arXiv.org>

- SPIRES-HEP: Contains over 850,000 bibliographic records for particle physics articles, including journal papers, preprints, technical reports, conference papers and theses. Comprehensively indexed with multiple links to full text as well as links to author and institutional information. Covers 1974 to the present with substantial older materials added. Updated daily with links to electronic texts, Durham Reaction Data, PDGLive etc. Searchable by citation, by all authors and authors' affiliations, title, topic, report number, e-print archive number, date, journal, etc. A joint project of the SLAC, DESY and Fermilab with the collaboration of Durham:

<http://www.slac.stanford.edu/spires/hep/>

- INSPIRE Beta: INSPIRE combines the most successful aspects of SPIRES with the modern technology of Invenio (the CERN open-source digital-library software). However, INSPIRE takes its own inspiration from more than just SPIRES and Invenio. In searching for a paper, INSPIRE will not only fully understand the search syntax of SPIRES, but will also support free-text searches like those in Google:

<http://inspirebeta.net>

More information about the project:

<http://www.projecthepinspire.net/>

- The CERN Document Server: contains records of more than 1,000,000 CERN and non-CERN articles, preprints, theses. Includes records for internal and technical notes, official CERN committee documents, and multimedia objects:
- <http://cdsweb.cern.ch/>
- NASA ASTROPHYSICS DATA SYSTEM: The ADS Abstract Service provides a search interface for four bibliographic databases covering: Astronomy and Astrophysics, Instrumentation, Physics and Geophysics, Science Education, and arXiv Preprints. Contains abstracts from articles and monographs as well as conference proceedings:

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http://adsabs.harvard.edu/ads_abstracts.html

- JACoW: This Joint Accelerator Conference Website. It contains the full text of all the papers of these accelerator conferences. Search by conference name, author, title, keyword or full text of the paper:

<http://www.JACoW.org/>

- KISS (KEK INFORMATION SERVICE SYSTEM) FOR PREPRINTS: KEK Library preprint and technical report database. Contains bibliographic records of preprints and technical reports held in the KEK library with links to the full text images of more than 100,000 papers scanned from their worldwide collection of preprints. Particularly useful for older scanned preprints:

<http://www-lib.kek.jp/KISS/kiss-prepri.html>

4. Conference Databases

- SPIRES CONFERENCES: Database of more than 17,000 past, present and future conferences, schools, and meetings of interest to high-energy physics and related fields. Covers 1973 to the future and over 200 earlier conferences. Recent years have listed between 700 and 900 events. Search or browse by title, acronym, date, location. Includes information about published proceedings, links to submitted papers from the SPIRES-HEP database, and links to the conference Web site when available. Links to a form with which one can submit a new conference or edit an existing one:

[http://www.slac.stanford.edu/spires/conferences/
additions.shtml](http://www.slac.stanford.edu/spires/conferences/additions.shtml)

to submit a new conference. Can also search for any conferences occurring by day, month, quarter, or year:

<http://www.slac.stanford.edu/spires/conferences/>

- CERN & HEP EVENTS: A list of current and upcoming conferences, schools, workshops, *etc.*, of interest to high-energy physicists. Organized by year and then by date. Covers from 1993 onwards:

<http://cdsweb.cern.ch/events/>

5. Particle Physics Journals & Reviews

A full list of URLs for journals can be found at:

<http://library.cern.ch/library/pdg/journals.html>

Please note that some of these journals may limit access to subscribers. If you encounter access problems, check with your institution's library.

6. Research Institutions

- SPIRES HEP and Astrophysics INSTITUTIONS: database of over 9,000 high-energy physics and astroparticle physics institutes, laboratories, and university departments in which research on particle physics is performed. Covers six continents and over a hundred countries. Provides an alphabetical list by country or an interface that is searchable by name, acronym, location, *etc.* Includes address, phone and fax numbers, e-mail address, and Web links where available. Has links to the recent HEP papers from each institution. Maintained by SLAC, DESY and Fermilab libraries. To search the Institutions database:

<http://www.slac.stanford.edu/spires/institutions/>

To search the top 500 HEP and astrophysics institutions by country:

<http://www.slac.stanford.edu/spires/inst/major.shtml>

- HEP INSTITUTES: Contains almost a thousand institutional addresses used in the CERN Library catalog. Includes, where available, the following: phone and fax numbers, e-mail addresses, and Web links. Provides free text searching and result sorting by organization, country, or town:

<http://cdsweb.cern.ch/collection/HEP%20Institutes>

7. People

- HEPNAMES: Searchable worldwide database of over 40,000 people associated with particle physics, astroparticle physics, synchrotron radiation, and related fields. Provides e-mail addresses, country in which the person is currently working, and a SPIRES HEP database search for their papers. If the person has supplied the following information, it lists the countries in which they did their undergraduate and graduate work, their URL, and their graduate students. It also provides information on the institutional affiliation of each researcher (as well as their affiliation history back to undergrad in many cases). It provides listings of Nobel Laureates, country statistics, Lab Directors, *etc.*:

<http://www.slac.stanford.edu/spires/hepnames/>

8. Collaborations & Experiments

- SPIRES EXPERIMENTS Database: Contains more than 2,400 past, present, and future experiments in elementary particle physics. Lists both accelerator and non-accelerator experiments. Includes official experiment name and number, location, spokespersons, and collaboration lists. Simple searches by participant, title, experiment number, institution, date approved, accelerator, or detector, return a result that fully describes the experiment, including a complete list of authors, title, description of the experiment's goals and methods, and a link to the experiment's Web page if available. Publication lists distinguish articles in refereed journals, theses, technical or instrumentation papers, and those which make the Topcite at 50+ subsequent citations or more:

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<http://www.slac.stanford.edu/spires/experiments/>

- COSMIC RAY/GAMMA RAY/NEUTRINO AND SIMILAR EXPERIMENTS: This is an extensive collection of experimental Web sites organized by focus of study and also by location. Additional sections link to educational materials, organizations and related Web sites, *etc.* Maintained at the Max Planck Institute for Nuclear Physics, Heidelberg:

[http://www.mpi-hd.mpg.de/hfm/CosmicRay/
CosmicRaySites.html](http://www.mpi-hd.mpg.de/hfm/CosmicRay/CosmicRaySites.html)

9. Jobs

- AIP Employment and Industry: American Institute of Physics career network for physics, engineering and related physical sciences:

<http://www.aip.org/careersvc/>

- APS Careers in Physics: The American Physical Society Jobs/careers page:

<http://www.aps.org/jobs/>

- Careers with Physics: Advice and resources from the UK Institute of Physics:

[http://www.iop.org/activity/careers/Careers/
Resources/Career_resources/page_3964.html](http://www.iop.org/activity/careers/Careers/Resources/Career_resources/page_3964.html)

- HEPJOBS DATABASE: Maintained by Fermilab and SLAC libraries, this database lists jobs in the fields of core interest to the particle physics and astroparticle physics communities. Use this page to post a job or to receive email notices of new job listings:

<http://www.slac.stanford.edu/spires/jobs/>

- Physicsweb.org: Listing of physics openings for all degree levels:

<http://physicsweb.org/jobs/>

10. Software Repositories

- CERNLIB: CERN PROGRAM LIBRARY: A large collection of general purpose libraries and modules offered in both source code and object code forms from the CERN central computing division. Provides programs applicable to a wide range of physics research problems such as general mathematics, data analysis, detectors simulation, data-handling, *etc.* Also includes links to commercial, free, and other software:

<http://wwwasd.web.cern.ch/wwwasd/index.html>

- FREEHEP: A collection of software and information about software useful in high-energy physics. Searching can be done by title, subject, date acquired, date updated, or by browsing an alphabetical list of all packages:

<http://www.freehep.org/>

- FERMITOOLS: Fermilab's software tools program provides a repository of Fermilab-developed software packages of value to the HEP community. Permits searching for packages by title or subject category:
<http://www.fnal.gov/fermitools/>
- HEPFORGE: HepForge is a development environment for any sort of academic software projects related to High-Energy Physics:
<http://www.hepforge.org/>
- HEPIC: SOFTWARE & TOOLS USED IN HEP RESEARCH: A meta-level site with links to other sites of HEP-related software and computing tools:
<http://www.hep.net/resources/software.html>
- GRID PHYSICS NETWORK: The GriPhyN Project is developing grid technologies for scientific and engineering projects that collect and analyze distributed, petabyte-scale datasets. Provides links to project information such as documents, education, workspace, virtual data toolkits, Chimera and Sphinx, as well as people, activities, news, and related projects:
<http://www.griphyn.org/>
- PARTICLE PHYSICS DATA GRID: The Web site for the U.S. collaboration of federal laboratories and universities to build a worldwide distributed computing model for current and future particle and nuclear physics experiments:
<http://www.ppdg.net/>

11. Particle Physics Education Sites

Particle Physics Education: General Sites:

- CONTEMPORARY PHYSICS EDUCATION PROJECT (CPEP): Provides charts, brochures, Web links, and classroom activities. Online interactive courses include: Fundamental Particles and Interactions; Plasma Physics and Fusion; and Nuclear Science:
<http://www.cpepweb.org/>

Particle Physics Education: Background Knowledge:

- ANTIMATTER: MIRROR OF THE UNIVERSE: Find out what antimatter is, where it is made, the history behind its discovery, and how it is a part of our lives. Features colorful photos and illustrations, a Kids Corner, and CERN physicists answering your questions on antimatter:
<http://livefromcern.web.cern.ch/livefromcern/antimatter/>
- BIG BANG SCIENCE—EXPLORING THE ORIGINS OF MATTER: This Web site, produced by the Particle Physics and Astronomy Research Council of the UK (PPARC), explains what physicists are looking for with their giant instruments called accelerators and particle detectors. Big Bang Science focuses on CERN particle

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detectors and on United Kingdom scientists' contribution to the search for the fundamental building blocks of matter.

<http://hepwww.rl.ac.uk/pub/bigbang/part1.html>

- **Stanford Linear Accelerator Center:** This Stanford Linear Accelerator Center Web site explains basic particle physics, linear and synchrotron accelerators, electron gamma showers, cosmic rays, and the experiments conducted at SLAC, including real-world applications. Intended for the general public as well as teachers and students:

<http://www2.slac.stanford.edu/vvc/>

- **THE WORLD OF BEAMS:** A site to visit if you wish to know a little or a lot about laser beams, particle beams, and other kinds of beams. Includes interactive tutorials, such as: What are Beams?, Working with Beams, and Beam Research and Technology. A good resource for physical science units involving energy, structure and properties of matter, and motion and forces for Grades 8-12. The information here is also helpful if you plan to tour any of the national laboratories listed in the "Libraries" section of this guide:

http://bc1.lbl.gov/CBP_pages/educational/WoB/home.htm

Particle Physics Education: Particle Physics Lessons & Activities:

- **FERMILAB EDUCATION OFFICE:** Outstanding collection of resources from the "grandmother" of all physics lab educational programs. Thoughtful unit and lesson plans in both physics and the environment (Fermilab is located on a rare, protected prairie in Illinois). Sections are organized by grade level:

<http://www-ed.fnal.gov/>

- **THE PARTICLE ADVENTURE:** One of the most popular Web sites for learning the fundamentals of matter and force. Created by the Particle Data Group of Lawrence Berkeley National Laboratory. An award-winning, interactive tour of the atom, with visits to quarks, neutrinos, antimatter, extra dimensions, dark matter, accelerators and particle detectors. Simple elegant graphics and translations into eleven languages:

<http://ParticleAdventure.org>

- **QUARKNET:** QuarkNet brings the excitement of particle physics research to high school teachers and their students. Teachers join research groups at sixty universities and labs across the country. These research groups are part of particle physics experiments at CERN, Fermilab, or SLAC. Students learn fundamental physics as they participate in inquiry-oriented investigations and analyze live, online data. QuarkNet is supported in part by the National Science Foundation and the U.S. Department of Energy:

<http://QuarkNet.fnal.gov>

Particle Physics Education: Art in Physics:

Note: This modest collection of physics art links is provided for high school art, photography, and literature teachers who may be interested in the intersections between

science and technology and art and literature, or who wish to take an interdisciplinary approach to the curriculum in collaborating with their science department colleagues.

- **HIDDEN CATHEDRALS–SCIENCE OR ART?:** This page provides roughly seventeen dramatic color images of the inner workings of particle detectors at the European Organisation for Nuclear Research (CERN) which is the world's largest particle physics center:

<http://public.web.cern.ch/public/about/how/art/art.html>

- **PHYSICS ICONS:** A video by Chip Dalby, SLAC InfoMedia Solutions, showing particle physics as delicate, experiential art. This meditation on the shifting nature of physics iconography was featured in the New York Museum of Modern Art's P.S.1 exhibit, *Signatures of the Invisible*:

[http://www-project.slac.stanford.edu/streaming-media/
Sub-Movies.html](http://www-project.slac.stanford.edu/streaming-media/Sub-Movies.html)

12. Physics Topics Pages

Topics Pages

- **CAMBRIDGE RELATIVITY: PUBLIC HOME PAGE:** These pages focus on the non-technical learner and explain aspects of relativity such as: cosmology, black holes, cosmic strings, inflation, and quantum gravity. Provides links to movies, research-level home pages and to Stephen Hawking's Web site:

<http://www.damtp.cam.ac.uk/user/gr/public/>

- **THE OFFICIAL STRING THEORY WEB SITE:** Outstanding compilation of information about string theory includes: basics, mathematics, experiments, cosmology, black holes, people (including interviews with string theorists), history, theater, links to other Web sites and a discussion forum:

<http://superstringtheory.com/>

- **SUPERSTRINGS:** An online introduction to superstring theory for the advanced student. Includes further links:

<http://www.sukidog.com/jpierre/strings/>

- **THE ULTIMATE NEUTRINO PAGE:** This page provides a gateway to an extremely useful compilation of experimental data and results:

<http://cupp.oulu.fi/neutrino/>

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13. Further Reading

Open Access Related Projects

- SCOAP3: The Sponsoring Consortium for Open Access Publishing in Particle Physics is a consortium of High-Energy Physics funding agencies, High-Energy Physics laboratories and leading national and international libraries and library consortia. Its aim is to facilitate Open Access publishing in High Energy Physics. The Open Access (OA) tenets of granting unrestricted access to the results of publicly-funded research are in contrast with current models of scientific publishing, where access is restricted to journal customers. In this model, HEP funding agencies and libraries, which today purchase journal subscriptions to implicitly support the peer-review service, federate to explicitly cover its cost, while publishers make the electronic versions of their journals free to read. Authors are not directly charged to publish their articles OA. The SCOAP3 web site:

<http://www.scoap3.org>

- PARSE.Insight: Permanent Access to the Records of Science in Europe is a two-year project co-funded by the European Union under the Seventh Framework Programme. It is concerned with the preservation of digital information in science, from primary data through analysis to the final publications resulting from the research:

www.parse-insight.eu

A recent article about PARSE.Insight:

First results from the PARSE.Insight project: HEP survey on data preservation, re-use and (open) access Authors: Andre Holzner, Peter Igo-Kemenes, Salvatore Mele arXiv:0906.0485v1. 2 Jun 2009. The online article:

<http://arxiv.org/abs/0906.0485>

Data Preservation

- ICFA Study Group on Data Preservation and Long Term Analysis in High Energy Physics. High Energy Physics experiments initiated with this Study Group a common reflection on data persistency and long term analysis in order to get a common vision on these issues and create a multi-experiment dynamics for further reference:

<https://www.dphep.org/>

Demographic Studies

- Two studies have been recently published, which provide an insight in some aspects of scientific publication production in HEP. These articles are useful background readings for anyone interested in how the SCOAP3 project started and evolved:

Quantitative Analysis of the Publishing Landscape in High-Energy Physics Salvatore Mele, David Dallman, Jens Vigen, Joanne Yeomans arXiv:cs/0611130v1 [cs.DL]. 26 Nov 2006. These results provide quantitative input to the ongoing debate on the possible transition of HEP publishing to an Open Access model.

<http://arxiv.org/abs/cs/0611130>

Quantitative Study of the Geographical Distribution of the Authorship of High-Energy Physics Journals Jan Krause; Carl Marten Lindqvist; Salvatore Mele CERN-OPEN-2007-014. 16 July 2007.

<http://www.scoap3.org/files/cer-002691702.pdf>

User Behaviour Studies

- *Information resources in High-Energy Physics: Surveying the present landscape and charting the future course* Anne Gentil-Beccot, Salvatore Mele, Annette Holtkamp, Heath B. O'Connell, Travis C. Brooks arXiv:0804.2701v2. 16 Apr 2008. These results inform the future evolution of information management in HEP and, as these researchers are traditionally “early adopters” of innovation in scholarly communication, can inspire developments of disciplinary repositories serving other communities.

<http://arxiv.org/abs/0804.2701v2>

Published version:

<http://www.slac.stanford.edu/spires/find/hep/www?eprint?=arXiv:0804.2701>

- *Citing and Reading Behaviours in High-Energy Physics. How a Community Stopped Worrying about Journals and Learned to Love Repositories* Anne Gentil-Beccot, Salvatore Mele, Travis C. Brooks arXiv:0906.5418v1. 30 Jun 2009. CERN-OPEN-2009-007, SLAC-PUB-13693.

<http://arxiv.org/abs/0906.5418>