Online Particle Physics Information

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1 Introduction

Online resources are used in a diverse and expanding set of ways in particle physics. Many of these resources have become central to our collective work. We provide a brief curated selection of the major resources here. An expanded and regularly updated online repository is referred to below and can be found at

https://github.com/particledatagroup/hep-resources

By contrast, it is meant to be inclusive and catalog all useful resources related to particle physics. The community is warmly invited to contribute in order to ensure a broad and up to date coverage of relevant resources. Practical details are available online.

2 Particle Data Group (PDG) resources

- **Review of Particle Physics (RPP):** A comprehensive report on the fields of particle physics and related areas of cosmology and astrophysics, including both review articles and a compilation/evaluation of data on particle properties. The review section includes articles, tables and plots on a wide variety of theoretical and experimental topics of interest to particle physicists and astrophysicists. The particle properties section provides tables of published measurements as well as the Particle Data Group's best values and limits for particle properties such as masses, widths, lifetimes, and branching fractions, as well as an extensive summary of searches for hypothetical particles. RPP is published as a large book every two years, with partial updates made available once each year on the web.
All the contents of the book version of RPP are available online:

https://pdg.lbl.gov

The printed book can be ordered:

https://pdg.lbl.gov/current/receive_our_products.html

Of historical interest is the complete RPP collection which can be found online:

https://pdg.lbl.gov/rpp-archive/
https://scientific-info.cern/search-and-read/online-resources/
review-particle-physics

- **Particle Physics booklet:** An abridged version of the Review of Particle Physics, available as a pocket-sized 250-page booklet. It is one of the most useful summaries of physics data. The booklet contains an abbreviated set of reviews and the summary tables from the most recent edition of the Review of Particle Physics.
  The PDF file of the booklet can be downloaded:

  https://pdg.lbl.gov/current/booklet.pdf

  The printed booklet can be ordered:

  https://pdg.lbl.gov/current/receive_our_products.html

- **PDGLive:** A web application for browsing the contents of the PDG database that contains the information published in the Review of Particle Physics. It allows one to navigate to a particle of interest, see a summary of the information available, and then proceed to the detailed information published in the Review of Particle Physics. Data entries are directly linked to the corresponding bibliographic information in INSPIRE.

  https://pdglive.lbl.gov

- **Computer-readable files:** Data files that can be downloaded from the PDG include tables of particle masses and widths, PDG Monte Carlo particle numbers, and cross-section data. The files are updated with each new edition of the Review of Particle Physics.

  https://pdg.lbl.gov/current/html/computer_read.html

3 Particle physics information platform

INSPIRE: INSPIRE serves as a one-stop information platform for the particle physics community, comprising interlinked databases on literature, authors, jobs, seminars, conferences, institutions and experiments (each described in more detail below). Run in collaboration by CERN, DESY, Fermilab, IHEP, IN2P3, and SLAC, it has been serving the scientific community for almost 50 years. Previously known as SPIRES, it was the first website outside Europe and the first database on the web. Close interaction with the user community and with arXiv, ADS, HEPData, ORCID, PDG and publishers is the backbone of INSPIRE's evolution. Since 2020, it is running on a modernized platform that is continuously being improved.

https://inspirehep.net/

4 Literature databases

Most research articles in the field of high-energy physics are first made available on the arXiv eprint server, where researchers can learn about the latest developments by browsing through the new announcements five days a week. They are indexed, together with all other publications in high-energy physics and related fields, in the INSPIRE literature collection. For neighboring fields such as astrophysics or mathematics, other databases are more exhaustive.

- **arXiv.org:** A repository of full-text articles in physics, astronomy, mathematics, computer science, statistics, nonlinear sciences, quantitative finance, quantitative biology, electrical engineering and systems science, and economics. Papers are submitted by registered authors to arXiv, often as preprints in advance of submission to a journal for publication; includes postprints, working papers, and other relevant material. Established in 1991, the repository is interlinked with ADS and INSPIRE, among others. Readers can browse subject categories or search by author, title, abstract, date, and other fields. Receive daily update alerts for subfields by email or RSS.

  https://arXiv.org

- **INSPIRE Literature:** The literature collection, the flagship of the INSPIRE suite, serves more than 1.4 million bibliographic records with a growing number of full-text articles attached and metadata including author affiliations, abstracts, references, experiments, key-

words as well as links to arXiv, ADS, PDG, HEPData, publisher platforms and other servers. It provides fast metadata searches that can be easily refined using facets, plots extracted from full text, author disambiguation, author profile pages and citation analysis.

<https://inspirehep.net/literature>

- **ADS:** The SAO/NASA Astrophysics Data System is a Digital Library portal offering access to 15 million bibliographic records in Astronomy and Physics. The ADS search engine also indexes the full-text for many publications in this collection and tracks citations. The system also provides access and links to a wealth of external resources, including electronic articles hosted by publishers and arXiv, data catalogs and a variety of data products hosted by the astronomy archives worldwide. The ADS can be accessed at:

<http://ads.harvard.edu/>

- **MathSciNet:** This database of almost 4 million items provides reviews, abstracts and bibliographic information for much of the mathematical sciences literature. Over 100,000 new items, most of them classified according to the Mathematics Subject Classification, and more than 80,000 reviews of the current published literature are added each year. Author identification allows users to search for publications by author and citation data allows users to track the history and influence of research publications.

<https://www.ams.org/mathscinet>

5 Journals

SCOAP³ Journals: A list of journals currently financed by the SCOAP³ consortium. All HEP publications in those journals are made freely available under Open Access conditions at no cost for the authors.

<https://www.scoap3.org/phase3-journals/>

6 Conference and seminars databases

- **INSPIRE Conferences:** The database of more than 24,000 past, present, and future conferences, schools, and meetings relevant to high-energy physics and related fields is searchable by title, acronym, series, date and location. Included are information about published proceedings, links to conference contributions in the INSPIRE HEP database, and links to the conference website when available. New conferences can be submitted from the entry page.

<https://inspirehep.net/conferences>

- **INSPIRE Seminars:** Created to support the surge of online seminars during the COVID19 pandemic, this database already contains more than 1,500 seminars in high-energy physics and related fields. Seminars can be filtered by date, series and subject and exported to a calendar. Direct links to join the online seminar and external resources are included. All seminars are community-maintained and can be submitted from the entry page.

<https://inspirehep.net/seminars>

7 Research institutions

INSPIRE Institutions: INSPIRE Institutions contains over 11,500 institutes, laboratories, and universities, where research on particle physics and astrophysics is led. Every record includes, whenever possible, as detailed information, such as address, web links, experiments, and links to INSPIRE papers authored by people affiliated to that institution. One can search for a particular institution by name, acronym, and location.

<https://inspirehep.net/institutions>

8 People

- **INSPIRE Authors:** Searchable worldwide database of more than a hundred thousand active, departed, retired, and deceased people associated with particle physics and related fields. The affiliation history of these researchers, their e-mail addresses, ORCIDs, web pages, experiments they participated in, PhD advisor, information on their graduate students and links to their papers and seminars are provided, as well as a user interface to update this information.

  https://inspirehep.net/authors

- **ORCID**: Registry providing persistent digital identifiers allowing to unambiguously identify researchers. Through integration in key research workflows such as manuscript and grant submission, it supports automated linkages between scientists and their professional activities ensuring that their work is recognized.

  https://orcid.org

9 Experiments

INSPIRE Experiments: Contains more than 3,700 past, present, and future experiments in particle physics. It lists and classifies both accelerator and non-accelerator experiments as well as theory collaborations. Includes official experiment name and number, location, and collaboration lists. Simple searches by participant, title, experiment number, institution, date approved, accelerator, or detector, return a description of the experiment, including a complete list of authors, title, overview of the experiment's goals and methods, and a link to the experiment's web page if available. Recently, it has expanded its scope to include particle accelerators besides experiments and to link them together.

https://inspirehep.net/experiments

10 Jobs

INSPIRE Jobs: Lists academic and research jobs in high energy physics, nuclear physics, accelerator physics and astrophysics with the option to post a job or to receive email notices of new job listings. Several hundreds of jobs are listed all year round, with more activity during the application season.

https://inspirehep.net/jobs

11 Software packages and repositories

A vast number of software tools are used for various aspects of high-energy physics research. Due to their number, their often specialized purpose and the quickly-changing nature of software, no attempt has been made to present them in this chapter. The accompanying online version contains an extensive categorized list of software.

12 Data repositories and preservation

Initiatives to preserve and disseminate data produced during different stages of research, from Monte Carlo events to machine-readable versions of tables in papers, have grown in recent years. Unfortunately, there currently exists no central resource aggregating all these data as is the case for the more established means of scholarly communication. Instead, there are a number of repositories targeting different types of data and research subjects. They are listed in the online version.

13 Particle physics education and outreach

Particle physics public engagement efforts are widespread, with laboratories, experiments, universities and individual researchers engaged in a range of efforts. The online version of this chapter provides links to resources for particle physicists wanting to become engaged in public education as well as resources that physicists can provide directly to students or lay people. There are class-

room activities, interactive websites, films, and direct links to education offices at institutions and experiments. Additionally, news sites relevant for experts and for the general public are provided.