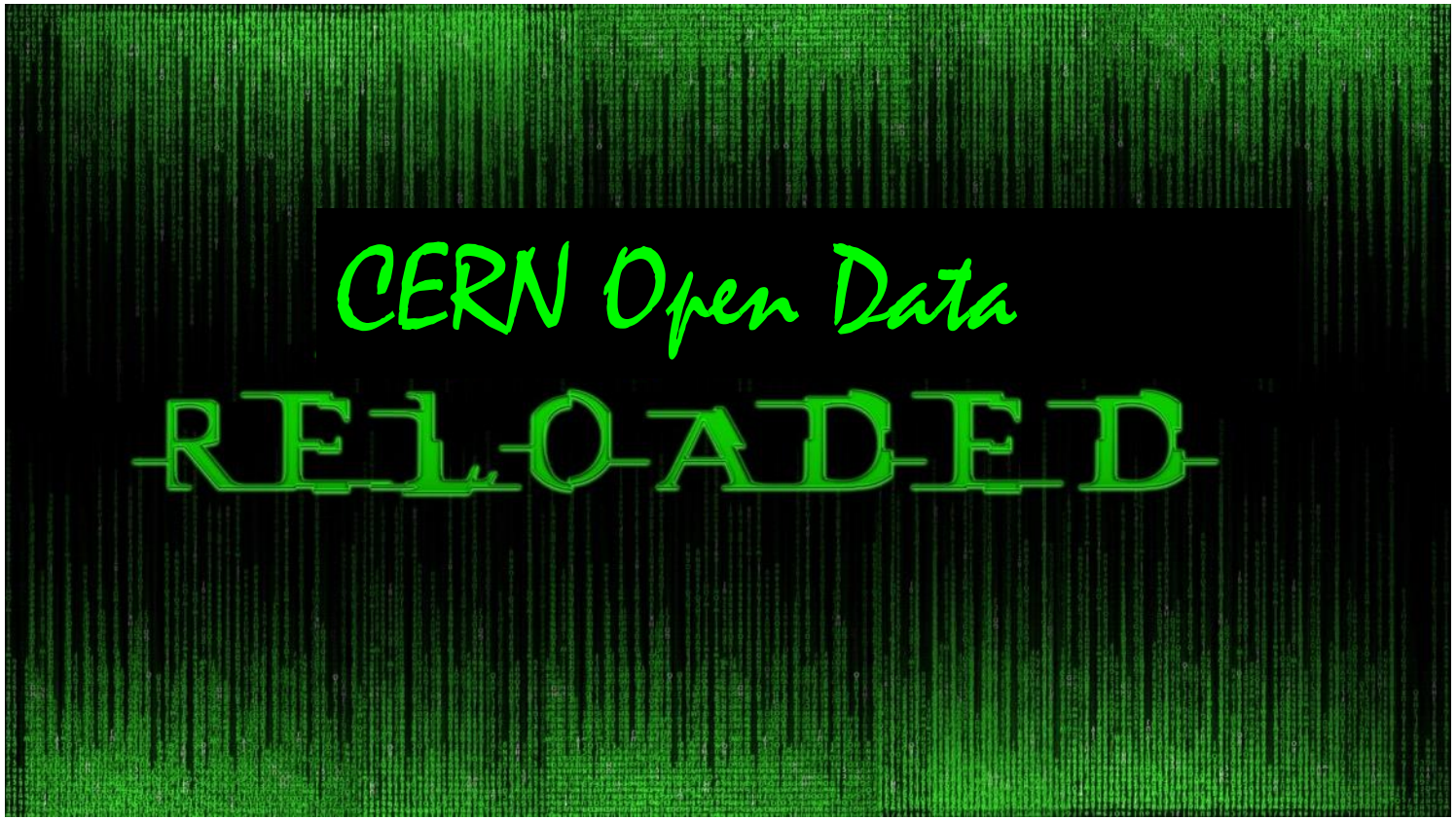
Exemple de bună practică - *reloaded*

Călin Alexa, IFIN-HH



CARTEA ALBĂ A TRANZIȚIEI CĂTRE ȘTIINȚA DESCHISĂ

(2023-2030)

Document strategic privind
Cadrul Dezvoltării
Științei Deschise în România

DECEMBRIE 2022

MINISTERUL CERCETĂRII, INOVĂRII ȘI DIGITALIZĂRII

UEFISCDI
Unitatea Executivă pentru Finanțarea Învățământului Superior, a Cercetării, Dezvoltării și Inovării

CARTEA ALBĂ A TRANZIȚIEI CĂTRE ȘTIINȚA DESCHISĂ

(2023-2030)

Document strategic privind

Cadrul Dezvoltării

Științei Deschise în România

Document realizat în cadrul proiectului „Creșterea capacității sistemului CDI de a răspunde provocărilor globale. Consolidarea capacității anticipatorii de elaborare a politicilor publice bazate pe dovezi" SIPOCA 592 (Cod MySMIS 127557)

„Cartea Albă a Tranziției către Știința Deschisă (2023-2030)" reprezintă forma finală a Documentului Strategic privind Cadrul Dezvoltării Științei Deschise în România, dezvoltată în baza versiunii suport de dialog „Cartea Verde a tranziției către știința deschisă", supusă consultării publice în perioada 18 august – 30 septembrie 2022. Cartea Albă detaliază implementarea principiilor, provocărilor și acțiunilor cuprinse în Strategia Națională de Cercetare, Inovare și Specializare Inteligentă 2022-2027 - obiectivul 1.2. „Asigurarea tranziției către știința deschisă și facilitarea drumului către excelență în cercetarea științifică"

Cartea Albă este disponibilă on-line la adresa: https://www.open-science.ro/resurse/cartea-alba-a-tranzitiei-catre-stiinta-deschisa-2023-2030

Autori: Alina Irimia, Ioana Trif, Mihaela Cucu, Andreea Popa.

Mulțumim celor care au contribuit la dezvoltarea documentului strategic în diferite etape:
Ioana Spanache, Valentin Cojanu și celorlalți colegi din proiectul SIPOCA592, co-coordonatorilor Inițiativei Naționale Cloud pentru Știința Deschisă (RO-NOSCI), colegilor din cadrul Catedrei UNESCO pentru Politici în Știință și Inovare-SNSPA, Ministerului Cercetării, Inovării și Digitalizării (MCID) și celor care au participat la procesul de dialog și consultare din partea comunității de cercetare, dezvoltare și inovare.
Totodată, adresăm mulțumiri domnului Adrian Curaj, director general al Unității Executive pentru Finanțarea Învățământului Superior, a Cercetării, Dezvoltării și Inovării pentru coordonarea cu o abordare prospectivă a procesului de planificare strategică.

MINISTERUL CERCETĂRII, INOVĂRII ȘI DIGITALIZĂRII

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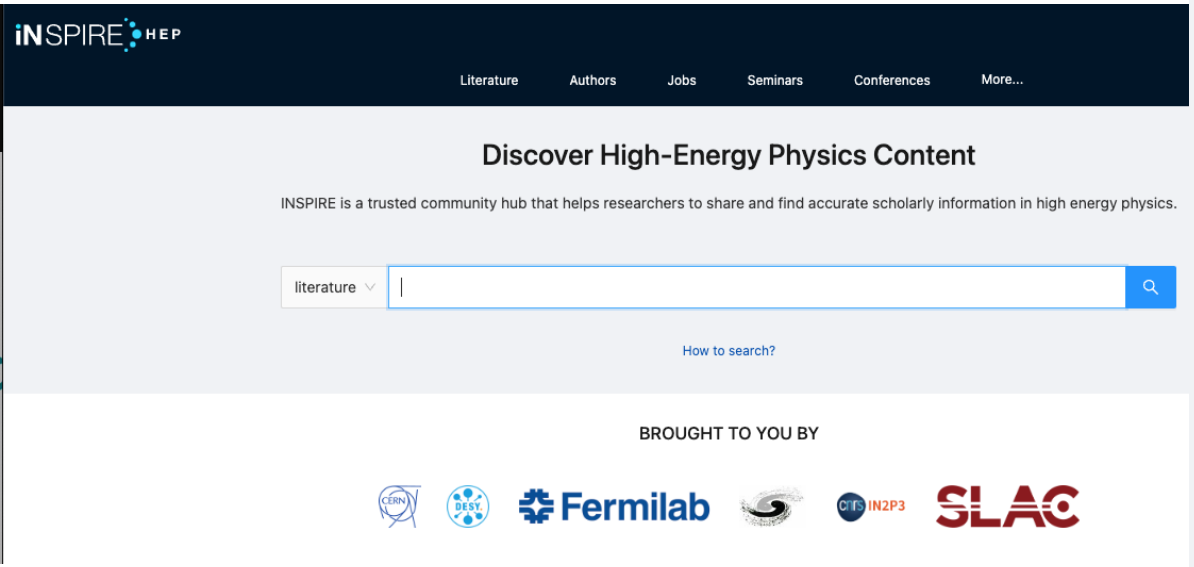
https://inspirehep.net/



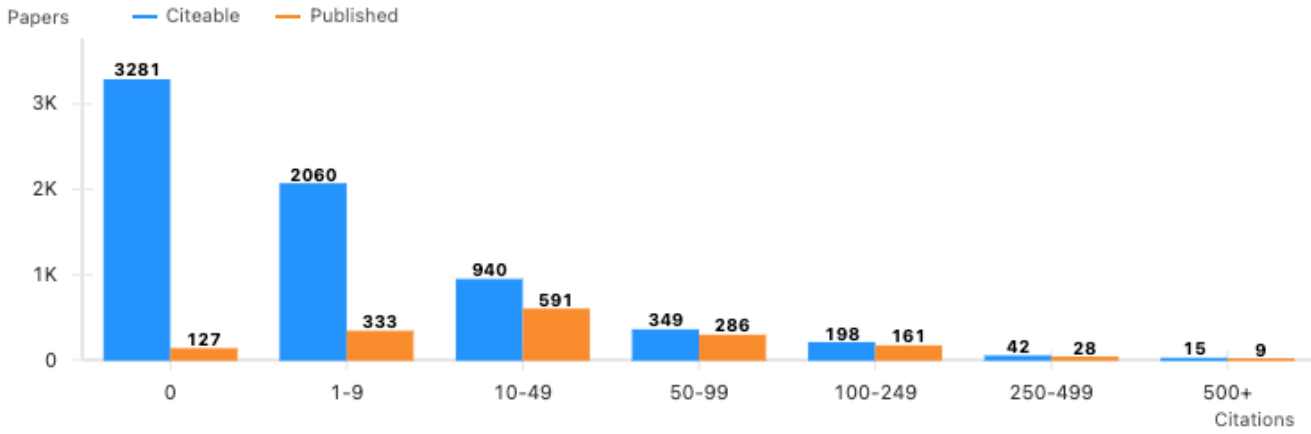
8,665 results | cite all

Citation Summary | Most Cited

Citation Summary

Exclude self-citations

	Citeable	Published
Papers	6,885	1,535
Citations	123,564	93,102
h-index	150	135
Citations/paper (avg)	17.9	60.7



Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC #1

ATLAS Collaboration • Georges Aad (Freiburg U.) et al. (Jul, 2012)

Published in: *Phys.Lett.B* 716 (2012) 1-29 • e-Print: 1207.7214 [hep-ex]

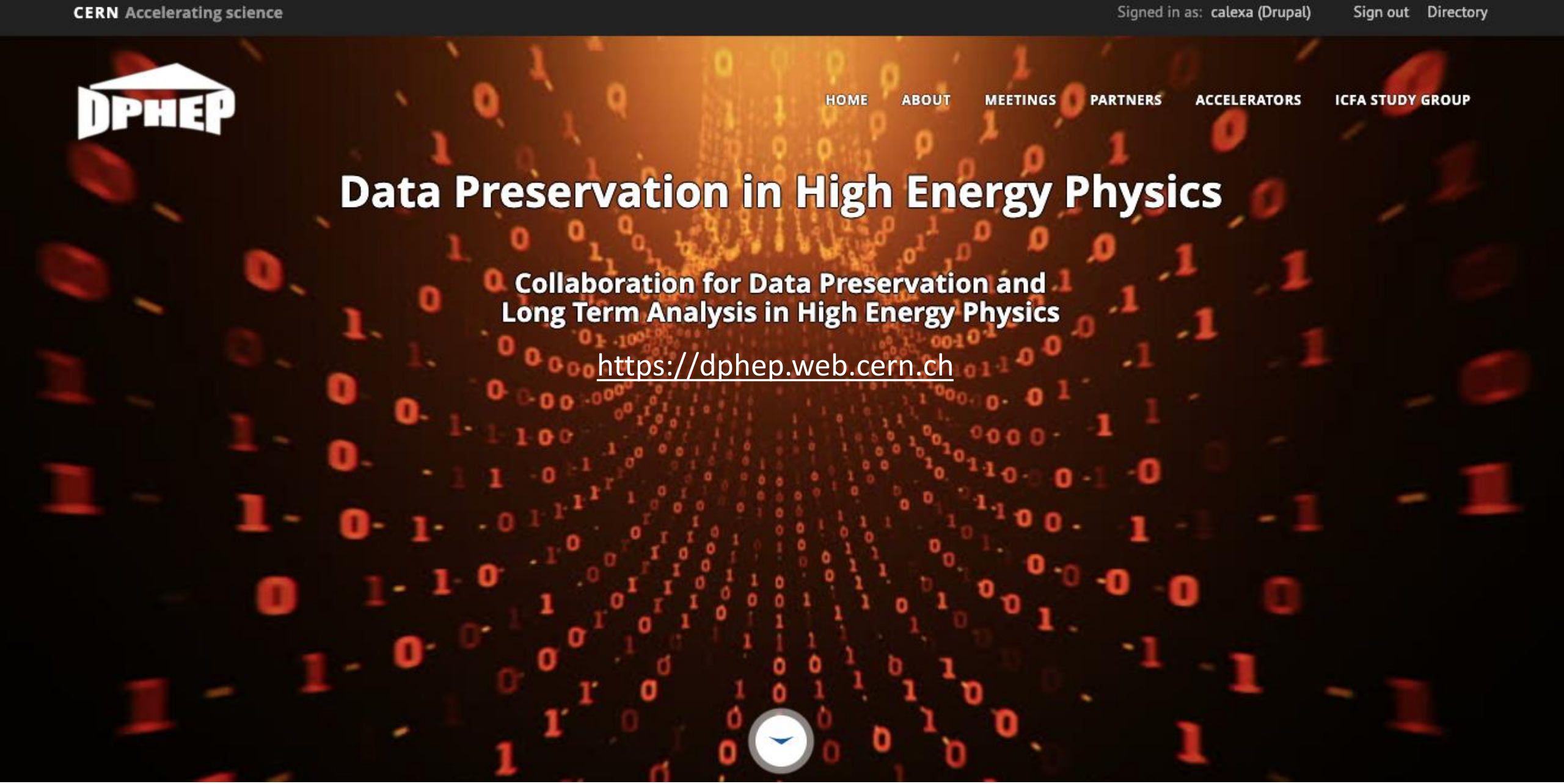
pdf | links | DOI | cite | claim | reference search | 14,798 citations

The ATLAS Experiment at the CERN Large Hadron Collider #2

ATLAS Collaboration • G. Aad (Marseille, CPPM) et al. (2008)

Published in: *JINST* 3 (2008) S08003

DOI | cite | claim | reference search | 11,143 citations



DPHEP is "Data Preservation in HEP" and is an International Collaboration of Institutes, Experiments, Funding agencies and other interested parties to implement the recommendations of the DPHEP study group. These are detailed in the Blueprint document available here.

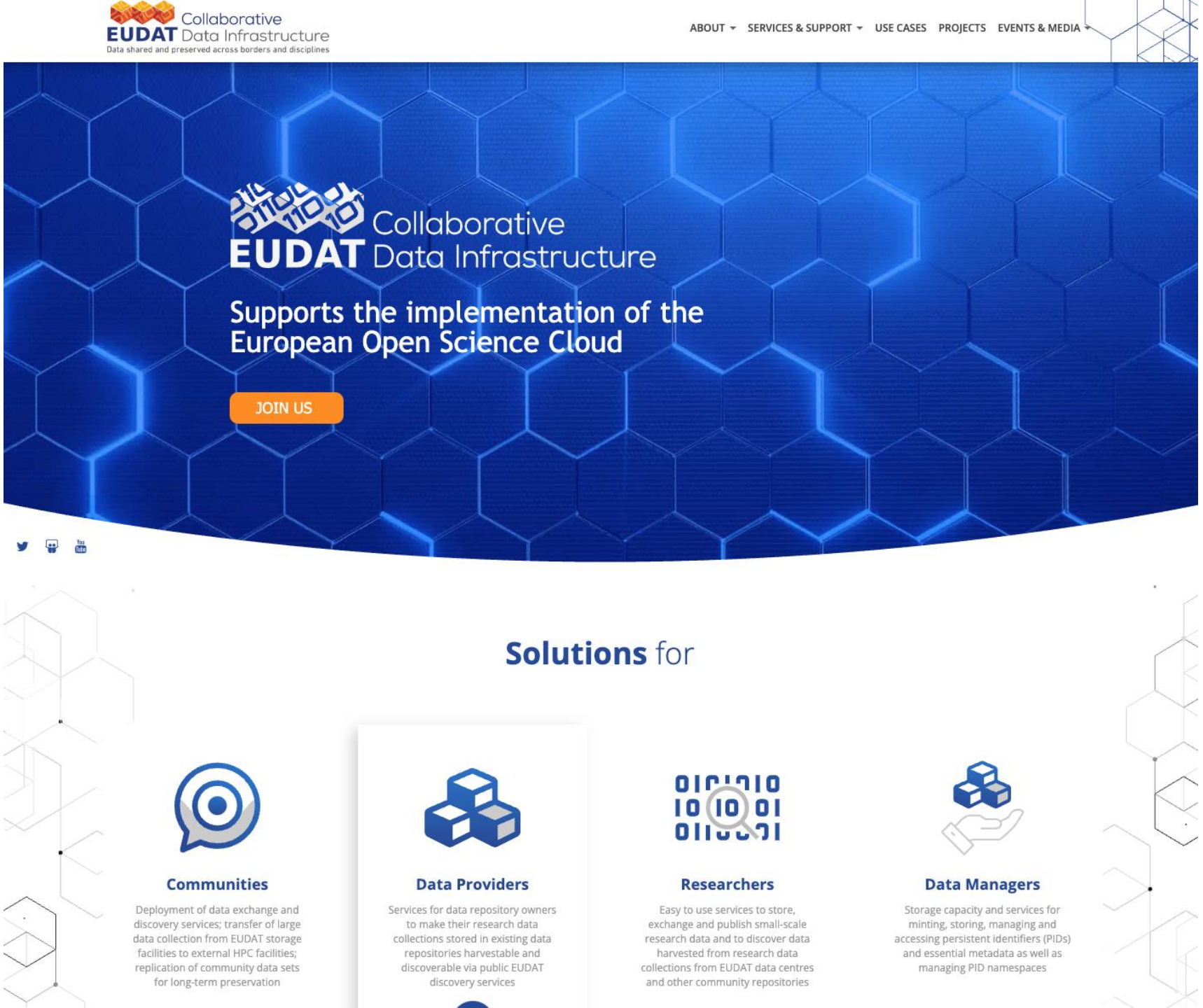
EXTERNAL RESOURCES

http://eudat.eu/

http://hepdata.net/

http://opendata.cern.ch/

http://eudat.eu/



HEPData

Repository for publication-related High-Energy Physics data

http://hepdata.net/

Search on 10152 publications and 129780 data tables.

Search for a paper, author, experiment, reaction | Search | Advanced

e.g. reaction P P --> LQ LQ X, title has "photon collisions", collaboration is LHCf or D0.

Data from the LHC

ATLAS View Data

ALICE View Data

CMS View Data

LHCb View Data

Recently Updated Submissions - View all

Search for W' bosons decaying to a top and a bottom quark in leptonic final states in proton-proton collisions at $\sqrt{s}$ = 13 TeV

The CMS collaboration

Search for dark photon decays to $\mu^+\mu^-$ at NA62

The NA62 collaboration

JHEP 09 (2023) 035

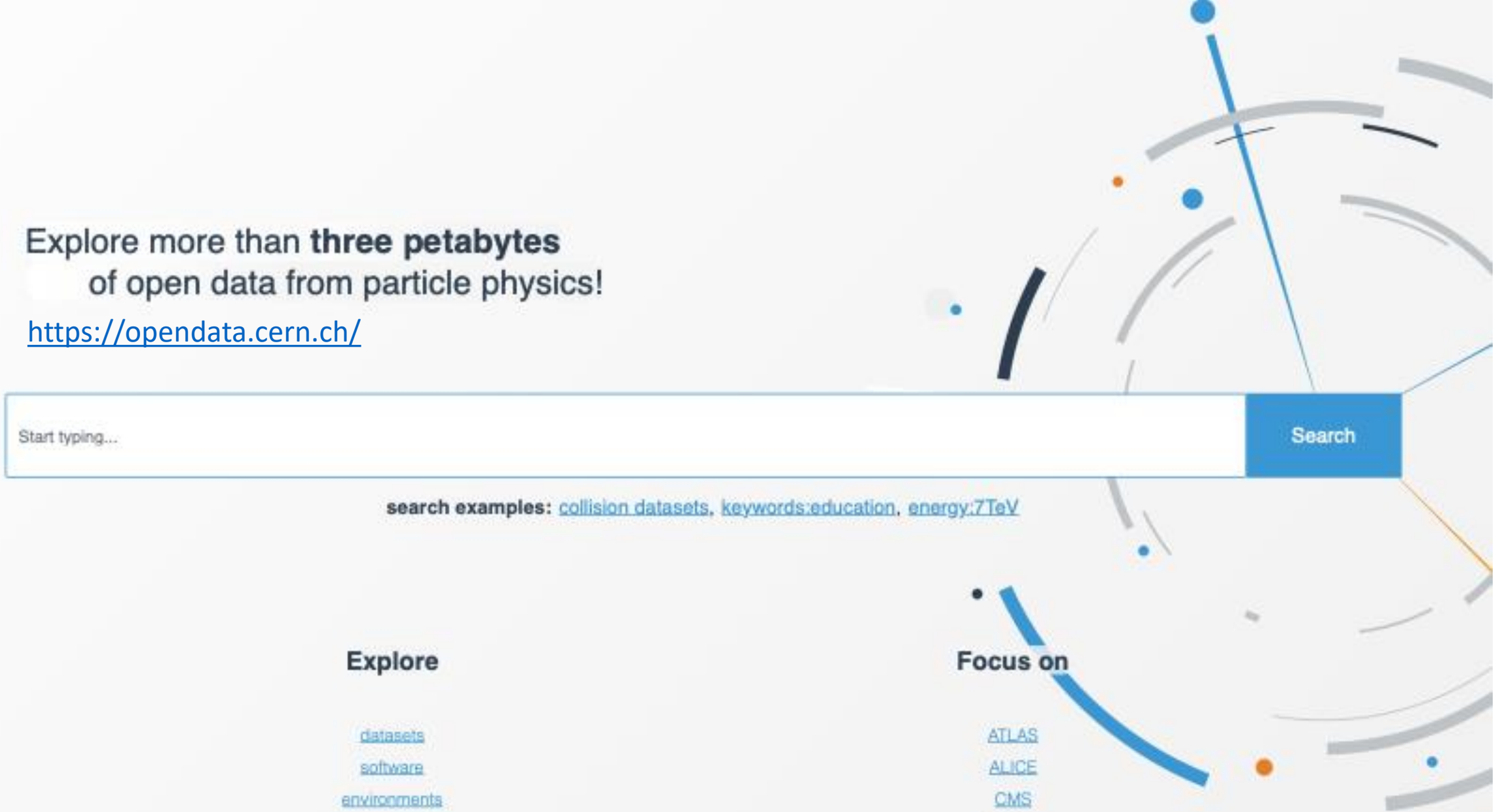
Search for narrow trijet resonances in proton-proton collisions at $\sqrt{s}$ = 13 TeV

The CMS collaboration

CMS-EXO-22-008

Explore more than **three petabytes**
of open data from particle physics!

https://opendata.cern.ch/



Explore

datasets
software
environments
documentation

Focus on

ATLAS
ALICE
CMS
LHCb
OPERA
PHENIX
Data Science

Filter by type

- Dataset 9697
- Documentation 2216
- Environment 56
- Glossary 996
- News 20
- Software 50
- Supplementaries 4372

Filter by experiment

- 1
- ALICE 26
- ATLAS 129
- CMS 13155
- LHCb 2183
- OPERA 910
- PHENIX 1

Filter by year

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- 2009 77
- 2010 1172
- 2011 3952
- 2012 3731
- 2013 458
- 2015 8596
- 2016 32
- 2018 5
- 2019 8

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- aod 207

AOD
Barn
Brick
CMSSW
Cross section
Derived
Drell-Yan
Electron
Events
Generator
Gluon
Hadron
Ion
Jet
Les Houches Event file
Luminosity
Lumisection
Monte Carlo
Muon
Neutrino

< 1 2 3 4 5 6

Found 9697 results.

LHCb 2012 Beam4000GeV MagDown EW Stream Stripping21r0p2
LHCb 2011 Beam3500GeV MagUp EW Stream Stripping21r1p2
LHCb 2012 Beam4000GeV MagUp EW Stream Stripping21r0p2
LHCb 2012 Beam4000GeV MagUp EW Stream Stripping21r0p1
LHCb 2011 Beam3500GeV MagUp LEPTONIC Stream Stripping21r1p2
LHCb 2012 Beam4000GeV MagDown RADIATIVE Stream Stripping21
LHC10c_pp_ESD_120822
ATLAS 13 TeV samples collection exactly three leptons (electron or muon), for 2020 Open Data release
ATLAS WPath 2015 Masterclass dataset 10
ATLAS WPath 2015 Masterclass dataset 11
ATLAS ZPath 2015 Masterclass dataset 14
ATLAS ZPath 2015 Masterclass dataset 15
ATLAS ZPath 2015 Masterclass dataset 4
ATLAS ZPath 2015 Masterclass dataset 20
ATLAS ZPath 2015 Masterclass dataset 8
ATLAS ZPath 2015 Masterclass dataset 17
ATLAS ZPath 2015 Masterclass dataset 11
ATLAS WPath 2015 Masterclass dataset 4
ATLAS 13 TeV samples collection Gamma-Gamma, for 2020 Open Data release
ATLAS ZPath 2015 Masterclass dataset 29

Reminder: A Brief Introduction to Open Data

- The Data Preservation for HEP (DPHEP) Working Group defined four levels of open data
  1. Published Results (journal articles, HepData; "additional documentation")
  2. Outreach and Education data ("simplified format")
  3. "**Reconstructed data**" ← What we're focusing on
  4. Raw detector data (will not be made public en masse; will be preserved)
- ATLAS CB endorsed a policy and implementation that laid out our plans and schedule
- Substantial open data already (mostly for outreach and education)

	ALICE	ATLAS	CMS	LHCb
Fraction of data released in: 5 years (6 years for CMS)	10%	25% (but limiting to <20% of the total data at that time)	50% (but limiting to <20% of the total data at that time)	50%
Fraction of data released in: 10 years	50%	50% (but limiting to <20% of the total data at that time)	100% (but limiting to <20% of the total data at that time)	100%
End-of-Collaboration	100%	100%	100%	100%

Table 1: *Summary of the fraction of Level 3 Open Data released after 5 (6 for CMS), 10-years, and at the end of life of the Collaboration, for each of the large LHC experiments. Note CMS latency is measured from the end of the year the data is taken, whereas the other experiments are counting the time from the end of the LHC running period (typically 3 years of running).*

From: Plans for Release of Open Data for Research,
Speaker: Zach Marshall, LBNL (US)
ATLAS week, 16-20 Oct. 2023

Software (Athena, AnalysisBase, etc) is already public.

Support for Open Data for Research

- The ‘hard part’ here is having sufficient public documentation that someone outside ATLAS could credibly run an analysis
  - Planning to add to atlassoftwaredocs and the existing tutorials as much as possible (but need to extract parts that depend on lxplus, the Grid, etc)
  - “Philosophical” documentation (what is a jet, what is a systematic uncertainty, etc) is evergreen, but the technical details for systematics and tools will have to be split out, because they are not (the ATLAS-internal version should continue to evolve)
  - Will start from the analysis tutorial, which is already public
  - The hardest part to document will almost certainly be **systematic uncertainties**
- Plan to build up example analyses from several sources
  - First example will be the ntuple maker from the Outreach team (to be made public; we hope to share as much as possible with the Outreach Open Data!)
  - Can also build a library of analyses (like Rivet has) from projects done over time
  - Could ask analysis teams if they would like to make their actual analysis public as well
- We need to agree on a **support model** (also with Outreach)
  - If someone wants another MC sample (or should we try to document how to make their own MC?) or help running, what do they do? Can we use ChATLAS for some support?

Summary of Open Data for Research

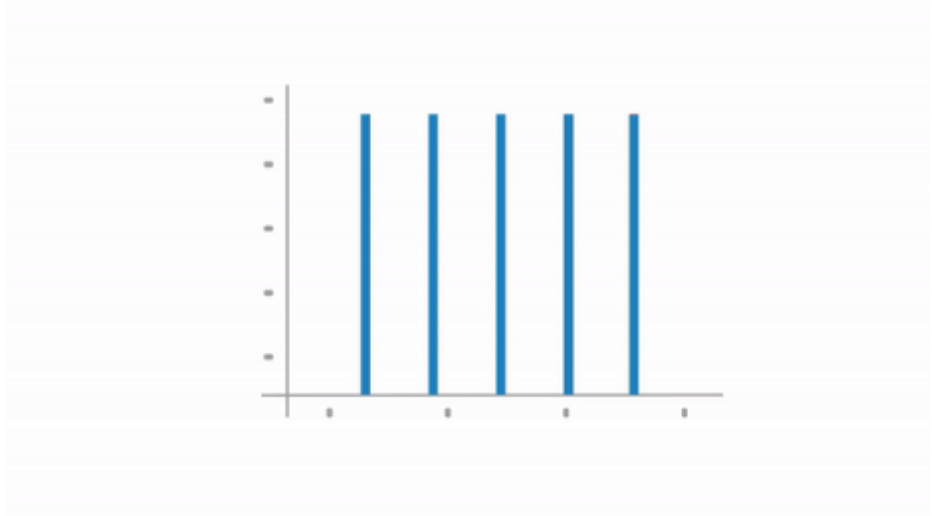
- Our first major Open Data for Research release is coming up fast
  - Proposal document will be circulated to the CB for approval soon
- We have considerable experience with outreach open data — this is not all new
  - Still, we should expect that it might not be perfect on the first try, and we might need to re-release or revamp certain aspects
- Other experiments have already released considerable Open Data for Research
  - And are planning to release much more (>10 times what we are releasing)
- One major open question is access methodology
  - Will we provide CPU at CERN? Allow cloud access?
  - Implications for accessibility and equity for projects and researchers worldwide
- This is an interesting test for long-term data preservation
  - One of the options being discussed by the legacy data support task force is essentially just providing exactly this open data, and that's it
- We expect the next major release to be in 2028

http://opendata.atlas.cern/

ATLAS Open Data

An Educational project in High Energy Physics

The ATLAS Collaboration's current approach on the release of datasets is intended for Education, Training and Outreach activities around the World. In order to fulfil that objective, the ATLAS Open Data project was created.

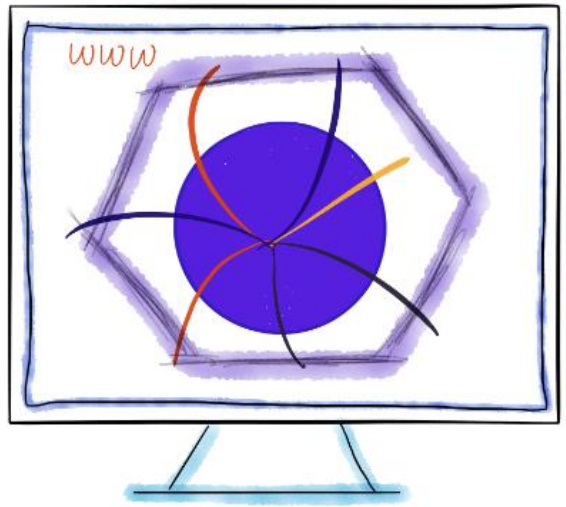


The ATLAS Open Data project aims to provide data and tools to high-school, masters and undergraduate students, as well as teachers and lecturers, to help educate them in physics analysis techniques used in experimental particle physics. Sharing data collected by the ATLAS experiment aims to generate excitement and enthusiasm for fundamental research, inspiring physicists of the future.

This site provides **introductory material and detailed information** for a wide audience about the ATLAS Open Datasets and their visualisation, the analysis frameworks and Jupyter notebooks, as well as the virtual machine usage instructions.

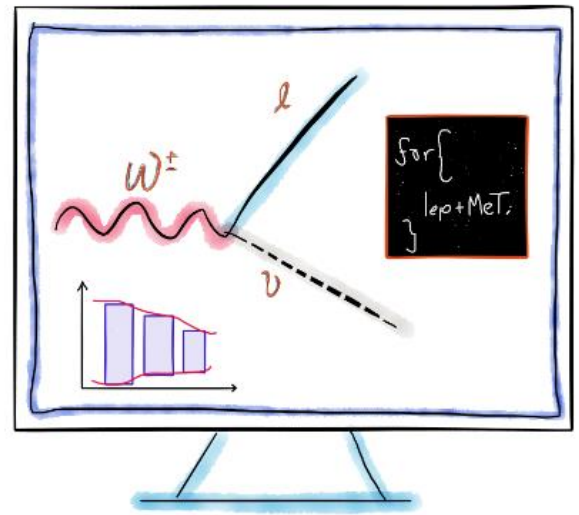
http://opendata.atlas.cern/apps/

The ATLAS detector



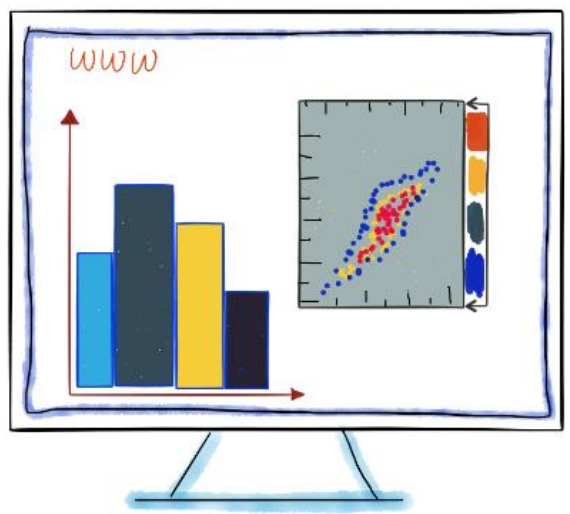
A look inside & around the ATLAS detector

Histogram Analyser: Simulated Data only



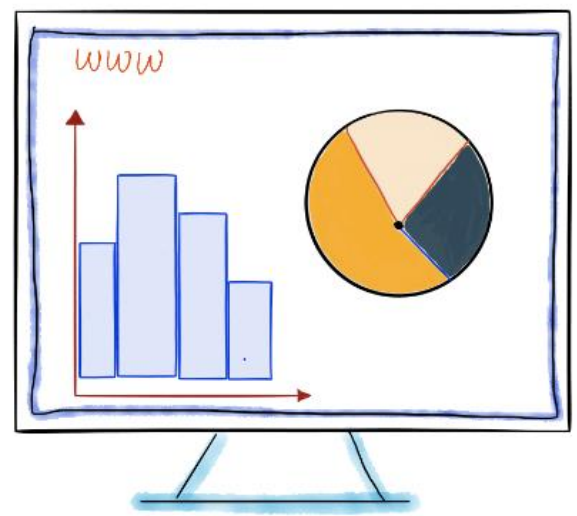
Perform real HEP analysis with your mouse

Histogram Analyser: Real & Simulated Data



Perform real HEP analysis with your mouse

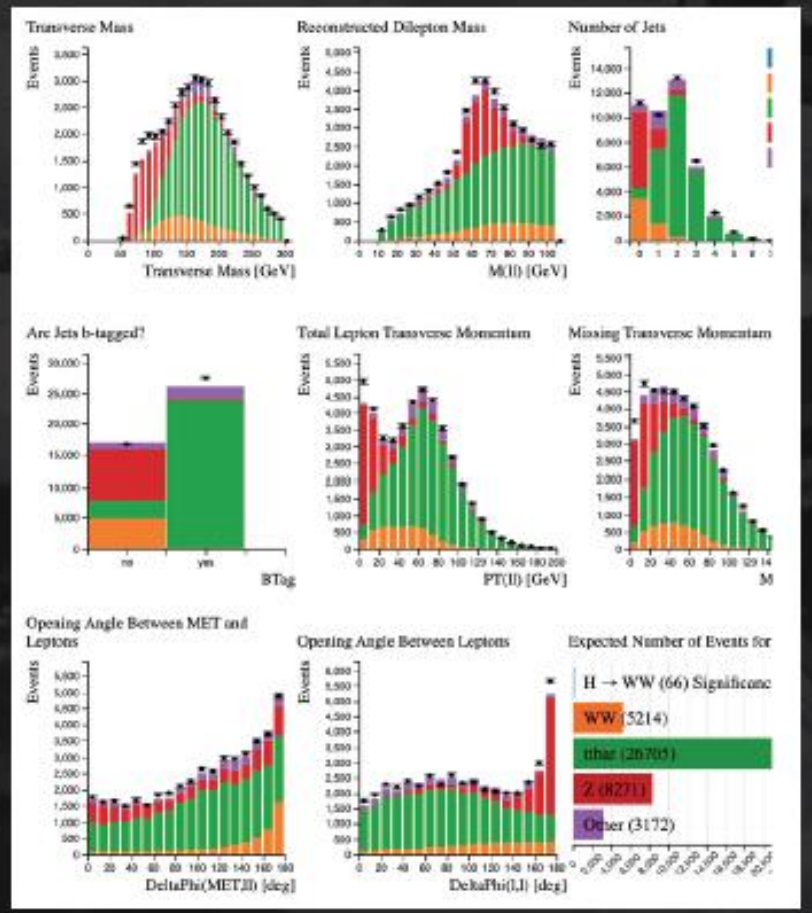
Jupyter Notebooks

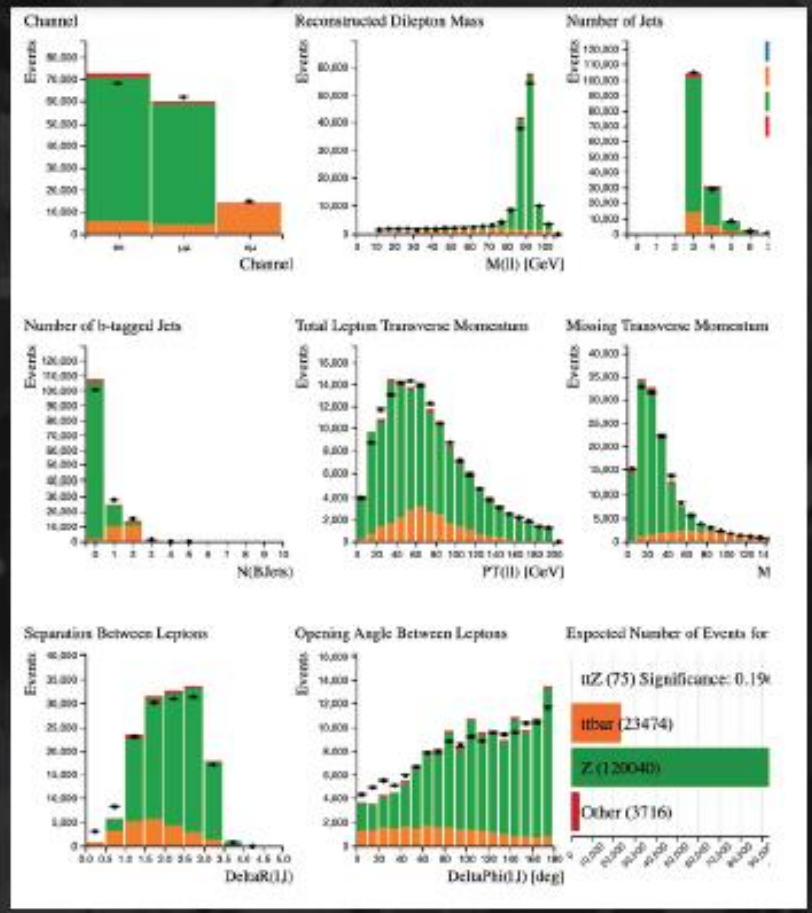


Let's run some real code on your browser

Visualisations using Historgram Analysers

Histogram Analyser H-> WW and TTZ (rare top)





Make your selection of events by clicking on the histogram areas you want

These work great!

We want to do more analyses - please contact us to make your analysis!

ATLAS Open Data : Vaules

ACCESSIBLE

The data and tools package must be **accessible to everyone**, keeping in mind the range of internet bandwidths, computational power, and access to experts.

TRANSFERABLE SKILLS

Along with particle physics analysis and ATLAS learning objectives, we must provide **skills in programming**, **software** and **machine learning**.

USEABLE & VERSITILE

Ensure that many different target audiences, with different backgrounds and skills are **able to use the data** and **tools** for a **wide range of learning objectives** and project goals.

IMPACTFUL & WIDE REACH

Reach students and public from minority groups in physics, and internationally to countries and regions with **less access**.

ATLAS OPEN DATA

Project Timeline

SURVEY

Brainstorming and Surveys, planning

STUDY

Group Organisation, looking at analyses and skills

PROPOSAL

Proposal for new release submitted to collaboration

APPROVAL

Approved and make pub note

PRODUCTION

Ntuple production, software tools, website, begins

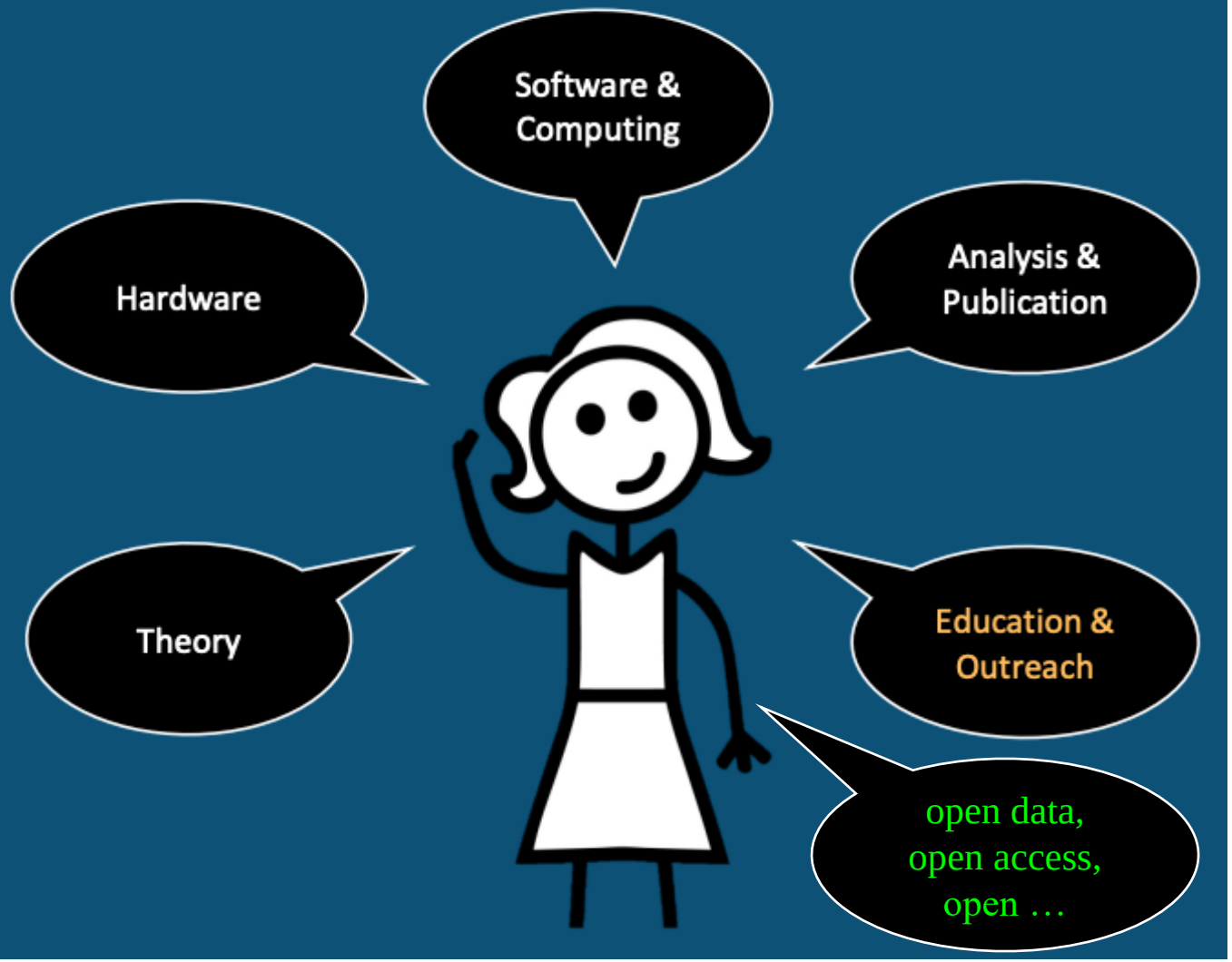
PUB NOTE

Validation plots

LAUNCH

Communications Drive: Push out to wide audiences

A well-rounded researcher



backup slides

The ATLAS experiment at CERN successfully uses a worldwide distributed computing Grid infrastructure to support its physics program at the Large Hadron Collider. ATLAS has expanded its computing capabilities by integrating cloud resources and is conducting R&D projects on Google Cloud as complementary resources for distributed computing. These activities leverage on some of the key features of commercial clouds: lightweight operation, elasticity and availability of multiple chip architectures. This paper reviews how cloud computing services have been seamlessly integrated as a traditional Grid site with the ATLAS workflow management and data management systems, while also providing novel infrastructures for interactive, parallel analysis. Some of the key findings that complement the on-premises computing model are highlighted, and several R&D projects that have benefited from large-scale, elastic resource provisioning models are described.

About

https://ippog.org/

The Collaboration

A **network** of scientists, science educators and communication specialists working across the globe in science education and public engagement for particle physics. Particle physics is the science of matter, energy, space and time. IPPOG brings new discoveries in this exciting field to young people and conveys to the public that the beauty of nature is indeed becoming understandable from the interactions of its most fundamental parts - the elementary particles.

The IPPOG experts come from prominent national or international professional physics centres, universities, societies and laboratories engaged in particle physics research, and from major particle physics experiments. The diversity of their cultural and educational backgrounds brings a large and important variety of skills to the table, which permit for the effective development of novel outreach activities with maximal impact. IPPOG members represent links to several national-level science networks. This constitutes IPPOG's global network of laboratories, institutions, organizations and individuals all passionate about particle physics. The expertise of IPPOG's members spans all aspects of collider and non-collider research, including astroparticle physics and accelerator and detector technology.

For its members, IPPOG is a **forum** for the exchange of information and best practices with colleagues from around the world, a brainstorming platform. It is also a platform of resources, ideas, inspiration, training and skill-building, providing access to programmes for students, teachers and the public. IPPOG increases international exposure and enables centralised and coordinated efforts through partnerships.

For particle physics and the scientific community, IPPOG represents a **key partner** for promoting and enabling their scientific mission and activities. It is a platform for engaging on a global level, building partnerships within the community and across communities, and for supporting the broader scientific objectives of particle physics and its role in society. For the worldwide particle physics community, IPPOG is a strong partner for engaging society in diverse ways adapted to the target audiences.

Herein lies the role of IPPOG as a pillar of particle physics: IPPOG is capable of reaching out and engaging large international audiences with particle physics activities in a manner that fosters long-term, sustainable support for fundamental scientific research around the world.

Activities

Projects and competitions

International

- Particles 4U
- Girls, do physics!
- Music Festival Colours of Ostrava in Czech Republic

National

- Creating Ambassadors for Science in Society
- Music Festival Pohoda in Slovakia
- Music Festival Colours of Ostrava in Czech Republic
- Universal Science Festival

View all

25 years IPPOG

IPPOG Resource Database

From wonders to excitement

IPPOG Resource Database is an online platform to facilitate the exchange of education and public engagement resources in particle physics and related sciences across the globe.

You will find high-quality engaging materials recommended by experts for teachers, students and the general public, which are readily understandable and regularly updated to reflect the latest discoveries in the field.

Search for more

INTERNATIONAL MASTERCLASSES

hands on particle physics

Participating Institutes
ROMANIA

Institutes

Bucharest:	Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH)
Bucharest:	University of Bucharest
Iasi:	„Alexandru Ioan Cuza" University of Iasi (Iasi UAIC)
Suceava:	Stefan cel Mare University of Suceava
Timișoara:	West University of Timișoara

National Responsible

Paul Gravila

West University of Timișoara
4 V. Pârvan Blv,
Timișoara, 300223
Romania

- primul eveniment IPPOG Masterclasses - Hands on particle physics - Iasi 2012
- IPPOG Masterclasses sunt organizate anual: Timișoara, Cluj-Napoca, Suceava, București, Iași, Brașov

ATLAS Outreach - Iasi

18 May 2012, 09:00 → 20 May 2012, 17:00 Europe/Bucharest

CERN

Calin Alexa (IFIN-HH)

Description: ATLAS Experiment at the LHC
http://atlas.ch
http://www.youtube.com/theATLASExperiment

Contact: Calin.Alexa@nipne.ro

LHC@InternationalMasterclasses

Join us on a journey to the smallest pieces of matter! Learn what is happening 100 meters below the ground at the European Organization for Nuclear Research (CERN). At the Large Hadron Collider, a circular collider with a circumference of 27 kilometres, the experiments ALICE, ATLAS, CMS, and LHCb are installed. The following short video gives an impression of the start of a fascinating journey looking for the origin of mass, Dark Matter, and new phenomena such as Supersymmetry or Extra Dimensions.

Particle Physics is exciting research! You can take part in that research on the following pages. The analysis of data samples that have been recorded in 2011 with the ATLAS detector is waiting for you. Under the points in the main (upper) menu, you can choose between two different measurements with original data from the ATLAS experiment. They are called W-path and Z-path. The processing of each path requires about 90 minutes. There is a theoretical introduction at the beginning of each task. This is followed by exercises and the actual measurement. Afterwards you can evaluate and interpret your result.

Please choose the W-Path or the Z-Path above. Now do some 21st century particle physics!

Links

Facebook-Seite

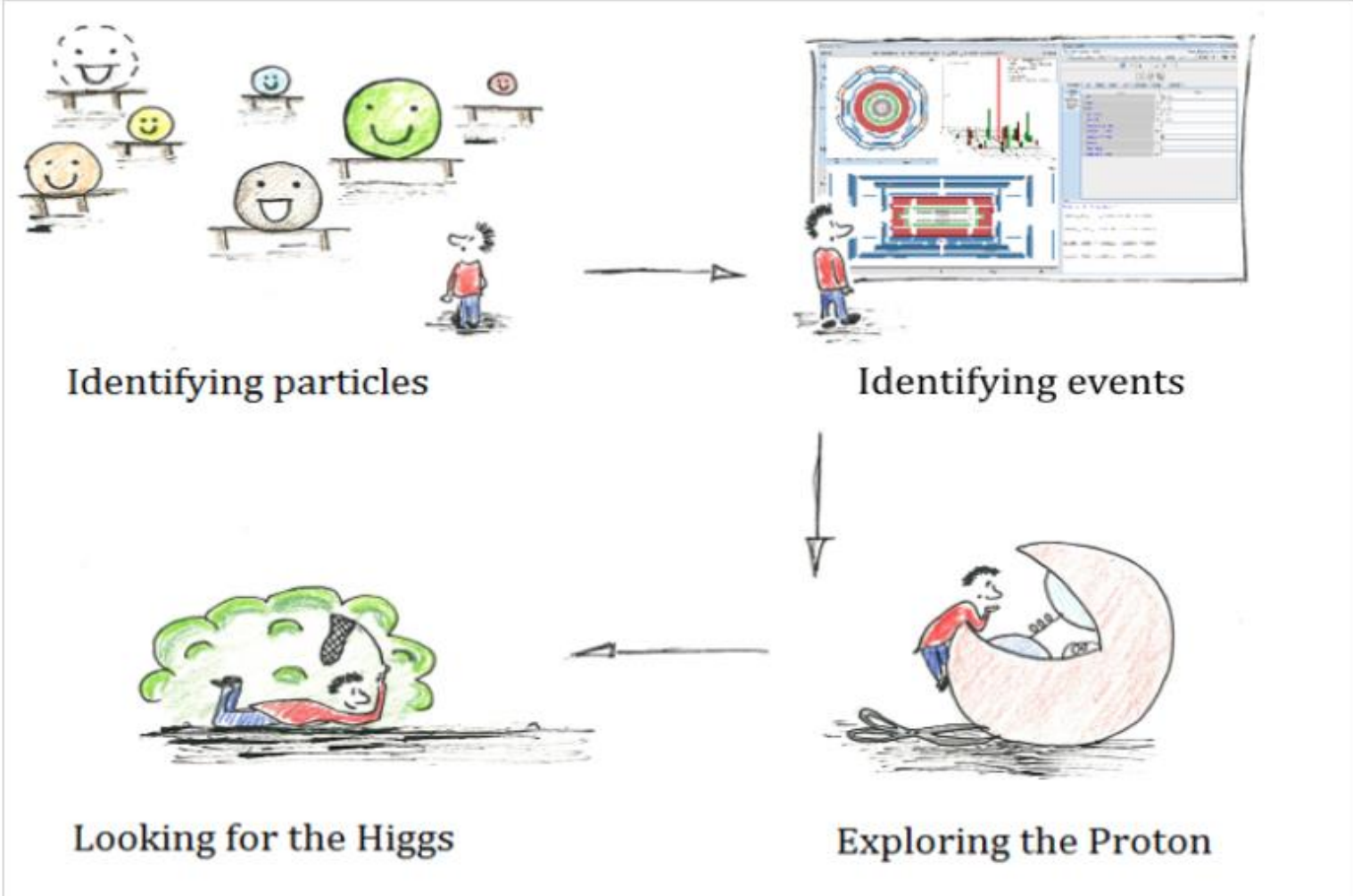
LHC Livescreen

ATLAS Webseite

Aims and Tasks

In the following chapters, you will learn how to recognise and distinguish different elementary particles. This knowledge will be essential for the following measurements. You will identify the inner structure of the proton and look for a new particle that has been seen at the LHC experiments ATLAS and CMS - the Higgs particle.

Use the menu on the right or the links that are hidden beneath each step to navigate.



Identifying Particles

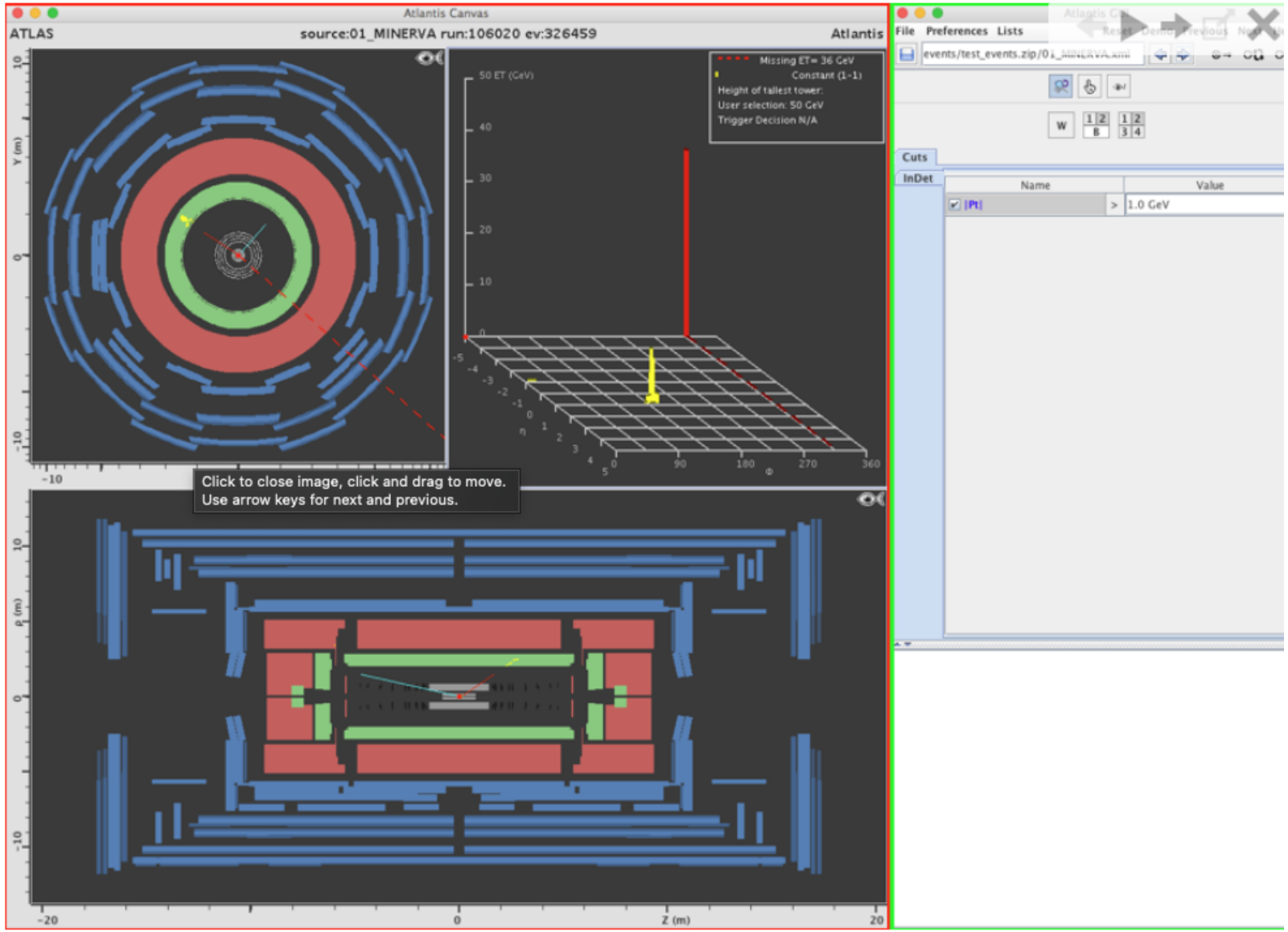
Here you can review how the detector is built. You will learn how elementary particles can be identified and how you can recognize them with our program. In a concluding exercise you may test your newly acquired knowledge.

Time for active playing! Discover the signals elementary particles leave in the detector with the help of the interactive animation of ATLAS below. Choose a specific particle from the upper menu and follow its way through the detector. Keep in mind that a dotted line represents the path of a neutral particle, which is not seen by the detector until it showers in a calorimeter, if at all.

The program that we will use is introduced on the next page. It illustrates events of proton-proton collisions in cross-sectional view similar to the picture you see at the bottom of the page.

If you do not yet understand the structure of the ATLAS detector, you can find more information under the menu item ATLAS detector.

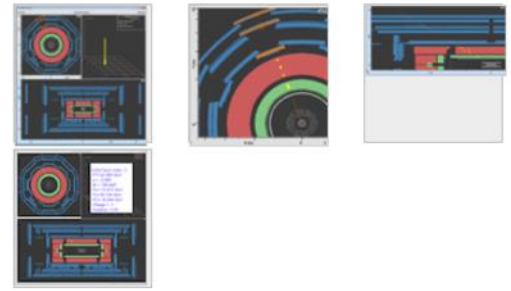
Program window

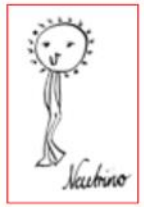


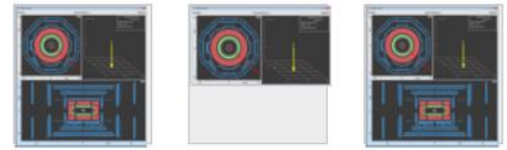
This picture shows the start view of the program MINERVA with the two windows ATLANTIS CANVAS (red frame), which provides different visual detector views of the event, and the graphical user interface ATLANTIS GUI (green frame), which controls settings and displays additional information about the event.

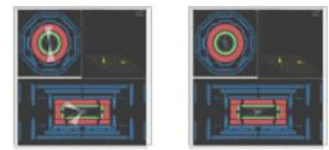
Identifying Particles

To analyse the proton-proton collisions that the program displays, you have to know how you can identify electrons (as well as positrons), muons (and anti-muons), neutrinos, and hadronic particles and jets using the event display. The photo gallery will show you how identifying particles works.







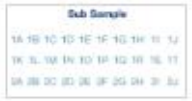


Measurement

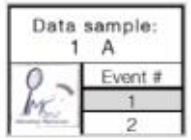
In this part you are going to analyse original data from the ATLAS experiment that was taken in 2011 in order to draw your own conclusion about the structure of the proton as well as understand how the search for the Higgs particle works.

For the measurement, you will need the following tools:

1. An event display program: MINERVA – Download starts here.



2. A data sample – All in all there are 12000 events. You will only analyze a subsample of 50 events. The 240 subsamples are labeled as follows: 1A, 1B, ..., 1T, 2A, ..., 2T, ..., 12A, ..., 12T.



3. A tally sheet (PDF) to count your events. In the upper left corner your subsample is defined.

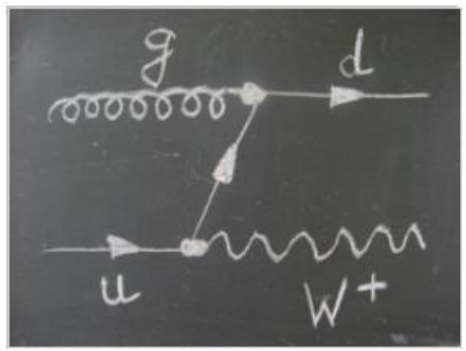
You are almost ready to start. On the next two pages, you will find the tasks for the measurement. Have fun!

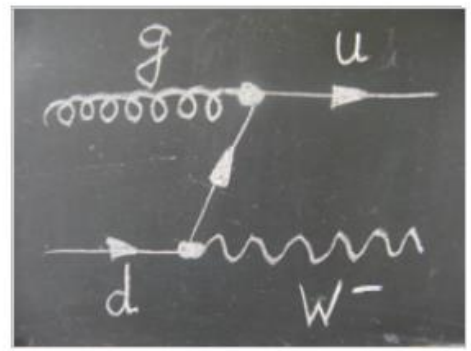
W-Path

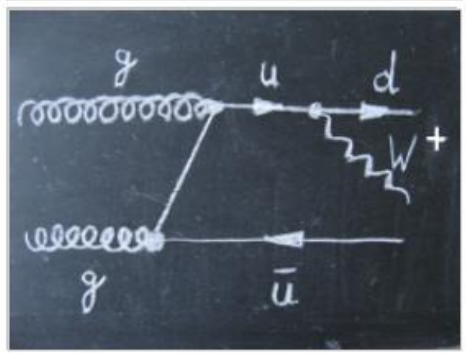
W Particle

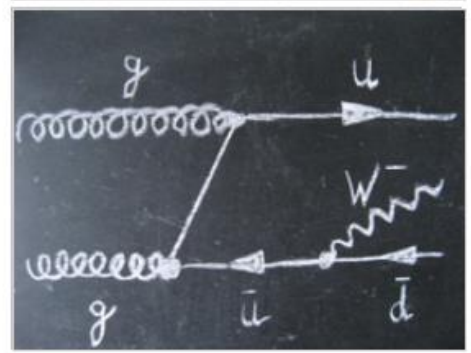
The exchange particles responsible for the weak interaction are the three carrier particles W^+, W^- and Z^0. W particles are produced in different ways during proton-proton collisions in the LHC. The following picture gallery introduces them. Feynman diagrams are used for better illustration. Get to know the diagrams here.

Production of different W particles

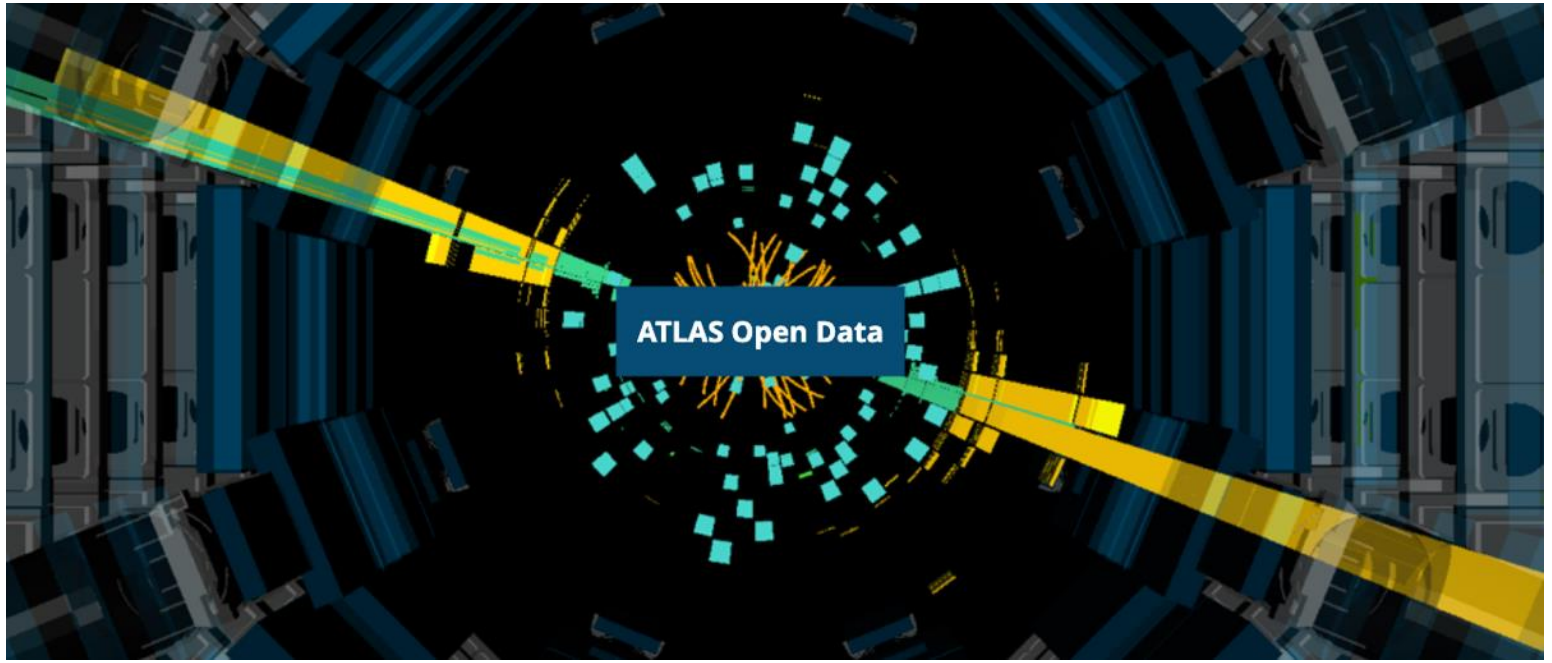








W-Path



https://ippog.org/

https://atlas.cern/Resources/Opendata

https://opendata.cern.ch/