

# Open Science

Lars Holm Nielsen  
CERN

African School of Physics 2024 (ASP2024)  
2024-07-12, Marrakech, Morocco

# 21st century research



# State of the art, for 17th century\*

Physics Letters B 716 (2012) 1–29

Contents lists available at SciVerse ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

## Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC<sup>☆</sup>

ATLAS Collaboration<sup>\*</sup>

This paper is dedicated to the memory of our ATLAS colleagues who did not live to see the full impact and significance of their contributions to the experiment.

ARTICLE INFO

ABSTRACT

Article history:  
Received 31 July 2012  
Received in revised form 8 August 2012  
Accepted 11 August 2012  
Available online 14 August 2012  
Editor: W.-D. Schlatter

A search for the Standard Model Higgs boson in proton–proton collisions with the ATLAS detector at the LHC is presented. The datasets used correspond to integrated luminosities of approximately  $4.8 \text{ fb}^{-1}$  collected at  $\sqrt{s} = 7 \text{ TeV}$  in 2011 and  $5.8 \text{ fb}^{-1}$  at  $\sqrt{s} = 8 \text{ TeV}$  in 2012. Individual searches in the channels  $H \rightarrow ZZ^{(*)} \rightarrow 4\ell$ ,  $H \rightarrow \gamma\gamma$  and  $H \rightarrow WW^{(*)} \rightarrow e\nu\mu\nu$  in the 8 TeV data are combined with previously published results of searches for  $H \rightarrow ZZ^{(*)}$ ,  $WW^{(*)}$ ,  $b\bar{b}$  and  $\tau^+\tau^-$  in the 7 TeV data and results from improved analyses of the  $H \rightarrow ZZ^{(*)} \rightarrow 4\ell$  and  $H \rightarrow \gamma\gamma$  channels in the 7 TeV data. Clear evidence for the production of a neutral boson with a measured mass of  $126.0 \pm 0.4 \text{ (stat)} \pm 0.4 \text{ (sys)} \text{ GeV}$  is presented. This observation, which has a significance of 5.9 standard deviations, corresponding to a background fluctuation probability of  $1.7 \times 10^{-9}$ , is compatible with the production and decay of the Standard Model Higgs boson.

© 2012 CERN. Published by Elsevier B.V. All rights reserved.

### 1. Introduction

The Standard Model (SM) of particle physics [1–4] has been tested by many experiments over the last four decades and has been shown to successfully describe high energy particle interactions. However, the mechanism that breaks electroweak symmetry in the SM has not been verified experimentally. This mechanism [5–10], which gives mass to massive elementary particles, implies the existence of a scalar particle, the SM Higgs boson. The search for the Higgs boson, the only elementary particle in the SM that has not yet been observed, is one of the highlights of the Large Hadron Collider [11] (LHC) physics programme.

Indirect limits on the SM Higgs boson mass of  $m_H < 158 \text{ GeV}$  at 95% confidence level (CL) have been set using global fits to precision electroweak results [12]. Direct searches at LEP [13], the Tevatron [14–16] and the LHC [17,18] have previously excluded, at 95% CL, a SM Higgs boson with mass below 600 GeV, apart from some mass regions between 116 GeV and 127 GeV.

Both the ATLAS and CMS Collaborations reported excesses of events in their 2011 datasets of proton–proton ( $pp$ ) collisions at centre-of-mass energy  $\sqrt{s} = 7 \text{ TeV}$  at the LHC, which were compatible with SM Higgs boson production and decay in the mass region 124–126 GeV, with significances of 2.9 and 3.1 standard deviations ( $\sigma$ ), respectively [17,18]. The CDF and DØ experiments at the Tevatron have also recently reported a broad excess in the mass region 120–135 GeV; using the existing LHC constraints, the observed local significances for  $m_H = 125 \text{ GeV}$  are  $2.7\sigma$  for CDF [14],  $1.1\sigma$  for DØ [15] and  $2.8\sigma$  for their combination [16].

The previous ATLAS searches in  $4.6\text{--}4.8 \text{ fb}^{-1}$  of data at  $\sqrt{s} = 7 \text{ TeV}$  are combined here with new searches for  $H \rightarrow ZZ^{(*)} \rightarrow 4\ell$ ,<sup>1</sup>  $H \rightarrow \gamma\gamma$  and  $H \rightarrow WW^{(*)} \rightarrow e\nu\mu\nu$  in the  $5.8\text{--}5.9 \text{ fb}^{-1}$  of  $pp$  collision data taken at  $\sqrt{s} = 8 \text{ TeV}$  between April and June 2012.

The data were recorded with instantaneous luminosities up to  $6.8 \times 10^{33} \text{ cm}^{-2}\text{s}^{-1}$ ; they are therefore affected by multiple  $pp$  collisions occurring in the same or neighbouring bunch crossings (pile-up). In the 7 TeV data, the average number of interactions per bunch crossing was approximately 10; the average increased to approximately 20 in the 8 TeV data. The reconstruction, identification and isolation criteria used for electrons and photons in the 8 TeV data are improved, making the  $H \rightarrow ZZ^{(*)} \rightarrow 4\ell$  and  $H \rightarrow \gamma\gamma$  searches more robust against the increased pile-up. These analyses were re-optimised with simulation and frozen before looking at the 8 TeV data.

In the  $H \rightarrow WW^{(*)} \rightarrow \ell\nu\ell\nu$  channel, the increased pile-up deteriorates the event missing transverse momentum,  $E_{\text{T}}^{\text{miss}}$ , resolution, which results in significantly larger Drell–Yan background in the same-flavour final states. Since the  $e\mu$  channel provides most of the sensitivity of the search, only this final state is used in the analysis of the 8 TeV data. The kinematic region in which a SM Higgs boson with a mass between 110 GeV and 140 GeV is

<sup>☆</sup> © CERN for the benefit of the ATLAS Collaboration.  
<sup>\*</sup> E-mail address: atlas.publications@cern.ch.

<sup>1</sup> The symbol  $\ell$  stands for electron or muon.

0370-2693/© 2012 CERN. Published by Elsevier B.V. All rights reserved.  
http://dx.doi.org/10.1016/j.physletb.2012.08.020

Physics Letters B 716 (2012) 30–61

Contents lists available at SciVerse ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

## Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC<sup>☆</sup>

CMS Collaboration<sup>\*</sup>

CERN, Switzerland

This paper is dedicated to the memory of our colleagues who worked on CMS but have since passed away. In recognition of their many contributions to the achievement of this observation.

ARTICLE INFO

ABSTRACT

Article history:  
Received 31 July 2012  
Received in revised form 9 August 2012  
Accepted 11 August 2012  
Available online 18 August 2012  
Editor: W.-D. Schlatter

Keywords:  
CMS  
Physics  
Higgs

Results are presented from searches for the standard model Higgs boson in proton–proton collisions at  $\sqrt{s} = 7$  and 8 TeV in the Compact Muon Solenoid experiment at the LHC, using data samples corresponding to integrated luminosities of up to  $5.1 \text{ fb}^{-1}$  at 7 TeV and  $5.3 \text{ fb}^{-1}$  at 8 TeV. The search is performed in five decay modes:  $\gamma\gamma$ ,  $ZZ$ ,  $WW^{(*)}$ ,  $\tau^+\tau^-$ , and  $b\bar{b}$ . An excess of events is observed above the expected background, with a local significance of 5.0 standard deviations, at a mass near 125 GeV, signalling the production of a new particle. The expected significance for a standard model Higgs boson of that mass is 5.8 standard deviations. The excess is most significant in the two decay modes with the best mass resolution,  $\gamma\gamma$  and  $ZZ$ ; a fit to these signals gives a mass of  $125.3 \pm 0.4 \text{ (stat.)} \pm 0.5 \text{ (syst.)} \text{ GeV}$ . The decay to two photons indicates that the new particle is a boson with spin different from one.

© 2012 CERN. Published by Elsevier B.V. All rights reserved.

### 1. Introduction

The standard model (SM) of elementary particles provides a remarkably accurate description of results from many accelerator and non-accelerator based experiments. The SM comprises quarks and leptons as the building blocks of matter, and describes their interactions through the exchange of force carriers: the photon for electromagnetic interactions, the W and Z gauge bosons for weak interactions, and the gluons for strong interactions. The electromagnetic and weak interactions are unified in the electroweak theory. Although the predictions of the SM have been extensively confirmed, the question of how the W and Z gauge bosons acquire mass whilst the photon remains massless is still open.

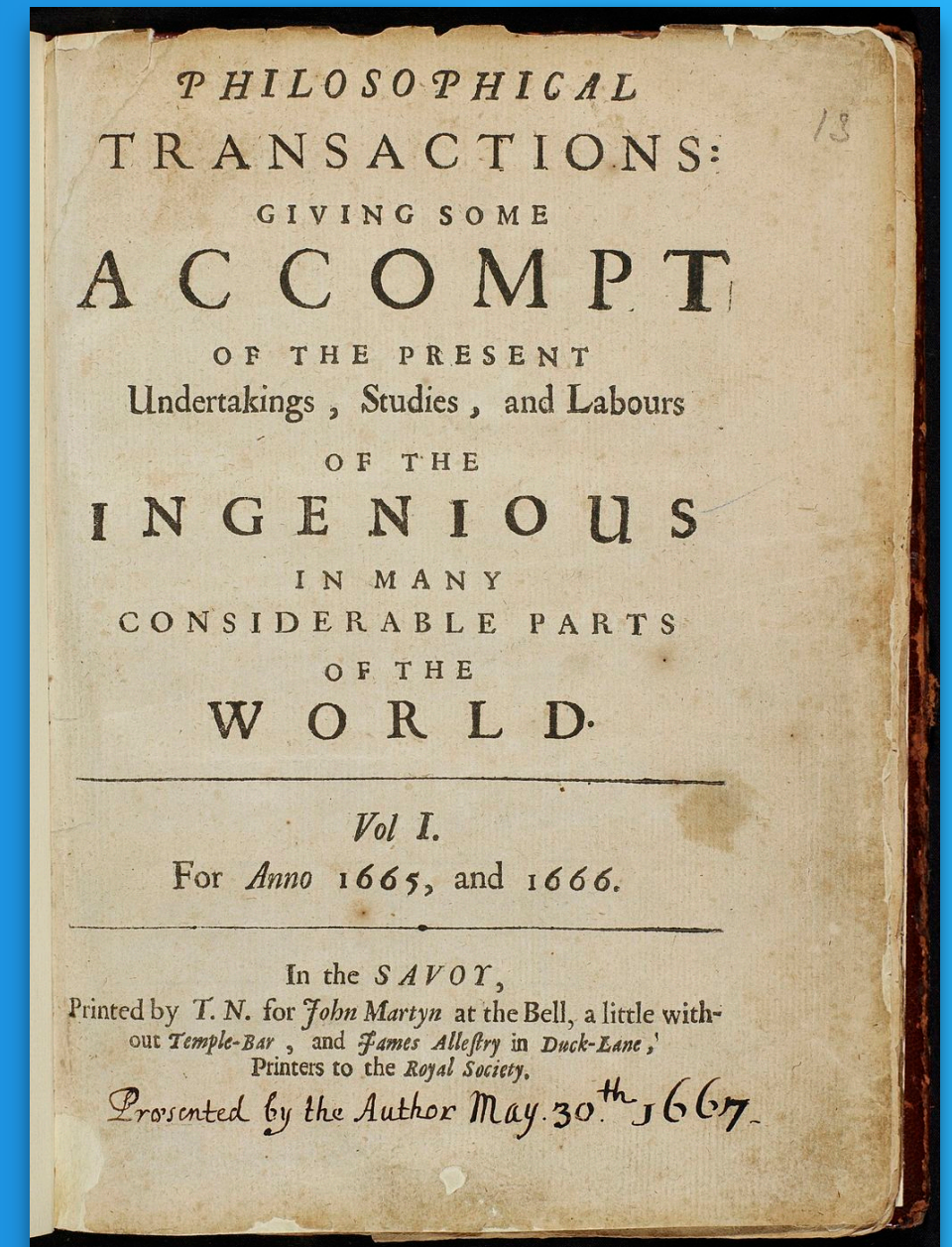
Nearly fifty years ago it was proposed [1–6] that spontaneous symmetry breaking in gauge theories could be achieved through the introduction of a scalar field. Applying this mechanism to the electroweak theory [7–9] through a complex scalar doublet field leads to the generation of the W and Z masses, and to the prediction of the existence of the SM Higgs boson (H). The scalar field also gives mass to the fundamental fermions through the Yukawa interaction. The mass  $m_H$  of the SM Higgs boson is not predicted by theory. However, general considerations [10–13] suggest that  $m_H$  should be smaller than  $\sim 1 \text{ TeV}$ , while precision electroweak measurements imply that  $m_H < 152 \text{ GeV}$  at 95% confidence level (CL) [14]. Over the past twenty years, direct searches for the Higgs boson have been carried out at the LEP collider, leading to a lower bound of  $m_H > 114.4 \text{ GeV}$  at 95% CL [15], and at the Tevatron proton–antiproton collider, excluding the mass range 162–166 GeV at 95% CL [16] and detecting an excess of events, recently reported in [17–19], in the range 120–135 GeV.

The discovery or exclusion of the SM Higgs boson is one of the primary scientific goals of the Large Hadron Collider (LHC) [20]. Previous direct searches at the LHC were based on data from proton–proton collisions corresponding to an integrated luminosity of  $5 \text{ fb}^{-1}$  collected at a centre-of-mass energy  $\sqrt{s} = 7 \text{ TeV}$ . The CMS experiment excluded at 95% CL a range of masses from 127 to 600 GeV [21]. The ATLAS experiment excluded at 95% CL the ranges 111.4–116.6, 119.4–122.1 and 129.2–541 GeV [22]. Within the remaining allowed mass region, an excess of events near 125 GeV was reported by both experiments. In 2012 the proton–proton centre-of-mass energy was increased to 8 TeV and by the end of June an additional integrated luminosity of more than  $5 \text{ fb}^{-1}$  had been recorded by each of these experiments, thereby enhancing significantly the sensitivity of the search for the Higgs boson.

This Letter reports the results of a search for the SM Higgs boson using samples collected by the CMS experiment, comprising data recorded at  $\sqrt{s} = 7$  and 8 TeV. The search is performed in

<sup>☆</sup> © CERN for the benefit of the CMS Collaboration.  
<sup>\*</sup> E-mail address: cms-publication-committee-chair@cern.ch.

0370-2693/© 2012 CERN. Published by Elsevier B.V. All rights reserved.  
http://dx.doi.org/10.1016/j.physletb.2012.08.021



Credit: Richard Valencia

# Reproducibility

15-20k people



Physics Letters B 716 (2012) 1–9

Contents lists available at ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC<sup>a</sup>

ATLAS Collaboration<sup>b</sup>

This paper is dedicated to the memory of our ATLAS colleagues who did not live to see the full impact and significance of their contributions to the experiment.

**ARTICLE INFO**

**Article history:**  
Received 10 July 2012  
Received in revised form 8 August 2012  
Accepted 13 August 2012  
Available online 14 August 2012  
Editor: W. H. Wilson

**ABSTRACT**

A search for the Standard Model Higgs boson in proton–proton collisions with the ATLAS detector at the LHC is presented. The dataset used correspond to an integrated luminosity of approximately 36.1 fb<sup>-1</sup> at  $\sqrt{s} = 7$  TeV in 2011 and 5.8 fb<sup>-1</sup> at  $\sqrt{s} = 8$  TeV in 2012. Individual searches in the channels  $H \rightarrow \gamma\gamma$ ,  $H \rightarrow ZZ$ ,  $H \rightarrow WW$ ,  $H \rightarrow \tau\tau$  and  $H \rightarrow b\bar{b}$  are carried out in the 7 TeV data set combined with previously published results of searches for  $H \rightarrow \gamma\gamma$ ,  $H \rightarrow ZZ$ ,  $H \rightarrow WW$ ,  $H \rightarrow \tau\tau$  and  $H \rightarrow b\bar{b}$  in the 7 TeV data and results from the production of a neutral Higgs boson with a mass of 120.3 to 134.4 GeV in the 8 TeV data set. The observation, which has a significance of 5.9 standard deviations, corresponding to a background fluctuation probability of  $1.7 \times 10^{-10}$ , is compatible with the prediction and decay of the Standard Model Higgs boson.

© 2012 CERN. Published by Elsevier B.V. All rights reserved.

**1. Introduction**

120–135 GeV) using the existing LHC constraint, the observed local significance for  $m_H = 125$  GeV are 2.7σ for CMS [14], 1.5σ for ATLAS [15] and 2.4σ for their combination [16].

The previous ATLAS searches in 4.6–4.8 fb<sup>-1</sup> of data at  $\sqrt{s} = 7$  TeV are combined here with new searches for  $H \rightarrow Z\gamma \rightarrow 4\ell$ ,  $H \rightarrow \gamma\gamma$  and  $H \rightarrow W\gamma \rightarrow \gamma\nu\nu$  in the 5.8–5.9 fb<sup>-1</sup> of pp collision data taken at  $\sqrt{s} = 7$  TeV between April and June 2012.

The data were recorded with instantaneous luminosities up to 4.8 × 10<sup>31</sup> cm<sup>-2</sup>s<sup>-1</sup>; they are therefore affected by instantaneous pile-up occurring in the same or neighbouring bunch crossings (pile-up) in the 7 TeV data; the average number of interactions per bunch crossing was approximately 10; the average increased to approximately 20 in the 8 TeV data. The reconstruction, identification and isolation criteria used for electrons and photons in the 8 TeV data are improved, making the  $H \rightarrow Z\gamma \rightarrow 4\ell$  and  $H \rightarrow \gamma\gamma$  searches more robust against the increased pile-up. These analyses were re-evaluated with simulation and data before looking at the 8 TeV data.

In the  $H \rightarrow W\gamma \rightarrow \ell\nu$  channel, the increased pile-up deteriorates the event missing transverse momentum,  $E_T^{\text{miss}}$ , resolution, which results in a significantly larger Drell–Yan background in the same-flavour final states. Since the  $\gamma\nu$  channel provides most of the sensitivity of the search, only this final state is used in the analysis of the 8 TeV data. The kinematic region in which a SM Higgs boson with a mass between 110 GeV and 140 GeV is

Physics Letters B 716 (2012) 9–41

Contents lists available at ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC<sup>a</sup>

CMS Collaboration<sup>b</sup>

This paper is dedicated to the memory of our colleagues who worked on CMS but have since passed away. In recognition of their many contributions to the achievement of this observation.

**ARTICLE INFO**

**Article history:**  
Received 13 July 2012  
Received in revised form 9 August 2012  
Accepted 13 August 2012  
Available online 14 August 2012  
Editor: W. H. Wilson

**ABSTRACT**

Results are presented from searches for the Standard Model Higgs boson in proton–proton collisions with the CMS detector at the LHC, using data samples collected at  $\sqrt{s} = 7$  and 8 TeV in the Compact Muon Solenoid experiment at the LHC, using data samples corresponding to an integrated luminosity of up to 5.8 fb<sup>-1</sup> at 7 TeV and 5.3 fb<sup>-1</sup> at 8 TeV. The search is performed in five decay modes:  $\gamma\gamma$ ,  $Z\ell\ell$ ,  $WW$ ,  $\tau\tau$  and  $b\bar{b}$ . An excess of events is observed above the expected background, with a local significance of 6.0 standard deviations, at a mass near 125 GeV, signalling the production of a new particle. The expected significance for a Standard Model Higgs boson with mass 125 GeV is 5.9 standard deviations. The excess is most significant in the most decay modes with the best mass resolution,  $\gamma\gamma$  and  $Z\ell\ell$ , at 80 to 90 GeV. The observation, which has a significance of 5.9 standard deviations, corresponding to a background fluctuation probability of  $1.7 \times 10^{-10}$ , is compatible with the prediction and decay of the Standard Model Higgs boson.

© 2012 CERN. Published by Elsevier B.V. All rights reserved.

**1. Introduction**

The Standard Model (SM) of elementary particles provides a remarkably accurate description of results from many accelerator and non-accelerator based experiments. The SM comprises quarks and leptons as the building blocks of matter, and describes their interactions through the exchange of force carriers: the photon for electromagnetic interaction, the W and Z bosons for weak interactions, and the gluons for strong interactions. The electromagnetic and weak interactions are unified in the electroweak theory. As a consequence of how the W and Z gauge bosons acquire mass, while the photon remains massless is still open.

Nearly 50 years ago it was proposed [1–4] that spontaneous symmetry breaking in gauge theories could be achieved through the introduction of a scalar field. Applying this mechanism to the electroweak theory [7–9] through a complex scalar doublet field leads to the generation of the W and Z masses, and to the prediction of the existence of the SM Higgs boson [8]. The scalar field also gives mass to the fundamental fermions through the Yukawa interaction. The mass  $m_H$  of the SM Higgs boson is not predicted by theory. However, general considerations [10–11] suggest that  $m_H$  should be smaller than ~1 TeV, while precision electroweak measurements imply that  $m_H < 162$  GeV at 95% confidence level [12,13]. Over the past twenty years, direct searches for the Higgs boson have been carried out at the LEP collider, leading to a lower bound of  $m_H > 114.4$  GeV at 95% CL [15], and at the Tevatron proton–antiproton collider, excluding the mass range 152–156 GeV at 95% CL [16] and detecting an excess of events, recently reported in [17–19], in the range 120–135 GeV.

The discovery or exclusion of the SM Higgs boson is one of the primary scientific goals of the Large Hadron Collider (LHC) [20]. Previous direct searches at the LHC were based on data from proton–proton collisions corresponding to an integrated luminosity of 5.8 fb<sup>-1</sup> collected at a centre-of-mass energy  $\sqrt{s} = 7$  TeV, and 5.3 fb<sup>-1</sup> collected at 8 TeV. The CMS experiment, including at 95% CL a range of masses from 127 to 400 GeV [21]. The ATLAS experiment, excluding at 95% CL the region 114–116 GeV, 119–122 GeV and 129–141 GeV [22]. Within the remaining allowed mass region, an excess of events near 125 GeV was reported by both experiments. In 2012, the proton–proton centre-of-mass energy was increased to 8 TeV and by the end of June an additional integrated luminosity of more than 5 fb<sup>-1</sup> had been recorded by each of these experiments, thereby enhancing significantly the sensitivity of the search for the Higgs boson.

This Letter reports the results of a search for the SM Higgs boson using samples collected by the CMS experiment, comprising data recorded at  $\sqrt{s} = 7$  and 8 TeV. The search is performed in

Only 6 of 53 landmark papers in cancer research were able to be confirmed

Begley, C., Ellis, L. Raise standards for preclinical cancer research. Nature 483, 531–533 (2012). <https://doi.org/10.1038/483531a>

# Reuse

US\$ 1.7 trillion  
Global spending on R&D

Source: UNESCO Institute for Statistics

Famous tea race, 1866, Foochow - Lon, with Fiery Cross, Taitsing, Serica & Taeping - latter won by 30 mins + Account in \* *China Clippers*, by Lubbock + Abstract logs, & further account in \* *The Clipper Ship Era*, A Clark, (1910);

**1894** brigantine: Labour recruiting voyage - lost at Santa Catalina I.  
\*\* + Diary by S Mercer-Smith, Govt Agent, 13.1-9.4, when wrecked. Returned to Cairns in "Thistle", 1-16 Jun; and in the "Fearless", 27.7 to 29.8.1894. MS in Oxley Library, Brisbane \* OM 76-4.

**1924-** schooner, 46t, of Port Adelaide. S Aust. coastal trade. Lost in/  
**-1927** + 6 Official logs \* Aust Archives, South Aust, D13. /Mar, 1928.



*The famous China tea clipper Ariel, circa 1866. (From the Illustrated London News).*

**ARIES** ship/bark?, J.B.KENNEDY: Eng - Melb, via Colombo?, & return?:  
**1853-54** + Log by Capt Kennedy held by NMM Greenwich, UK \* KEN/1

Ships logs from 18th century used for climate research

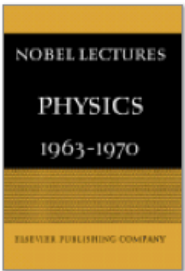
Source: University of Sunderland. "18th Century Ships' Logs Predict Future Weather Forecast." ScienceDaily. ScienceDaily, 6 October 2009. <[www.sciencedaily.com/releases/2009/10/091006104627.htm](http://www.sciencedaily.com/releases/2009/10/091006104627.htm)>

# Paywalls

Brought to you by: CERN Library

ScienceDirect Journals & Books Help Search My account European Organization ...

## Purchase document



**Physics 1970**  
Physics, 1963–1970  
2013, Page 301

### Purchase options

Academic and personal  
For academic or personal use only.

**US\$31.50**  
Local taxes may apply

Online access for 48 hours with the option to save or download the article in PDF format. [Learn more](#)

[Add to Cart](#)

Looking for a customized option?  
Contact sales for special pricing for your organization [Contact sales](#)

38%

Elsevier margin 2022

In Science, Technical, Medical area

£ 2,68 billion

Elsevier profit 2022

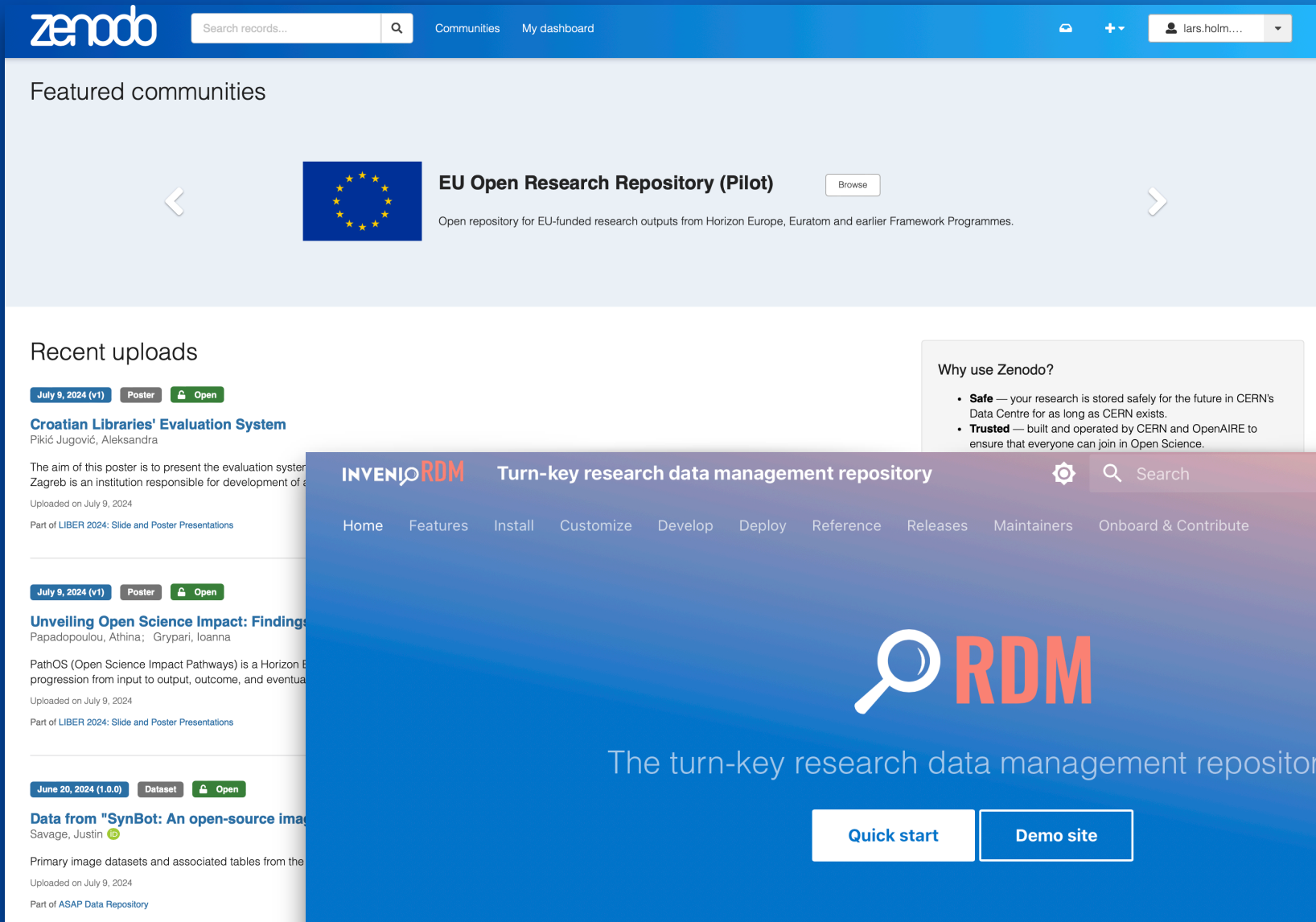
Source: Results for the year to 31 December 2022, RELX, Elsevier

# Who am I

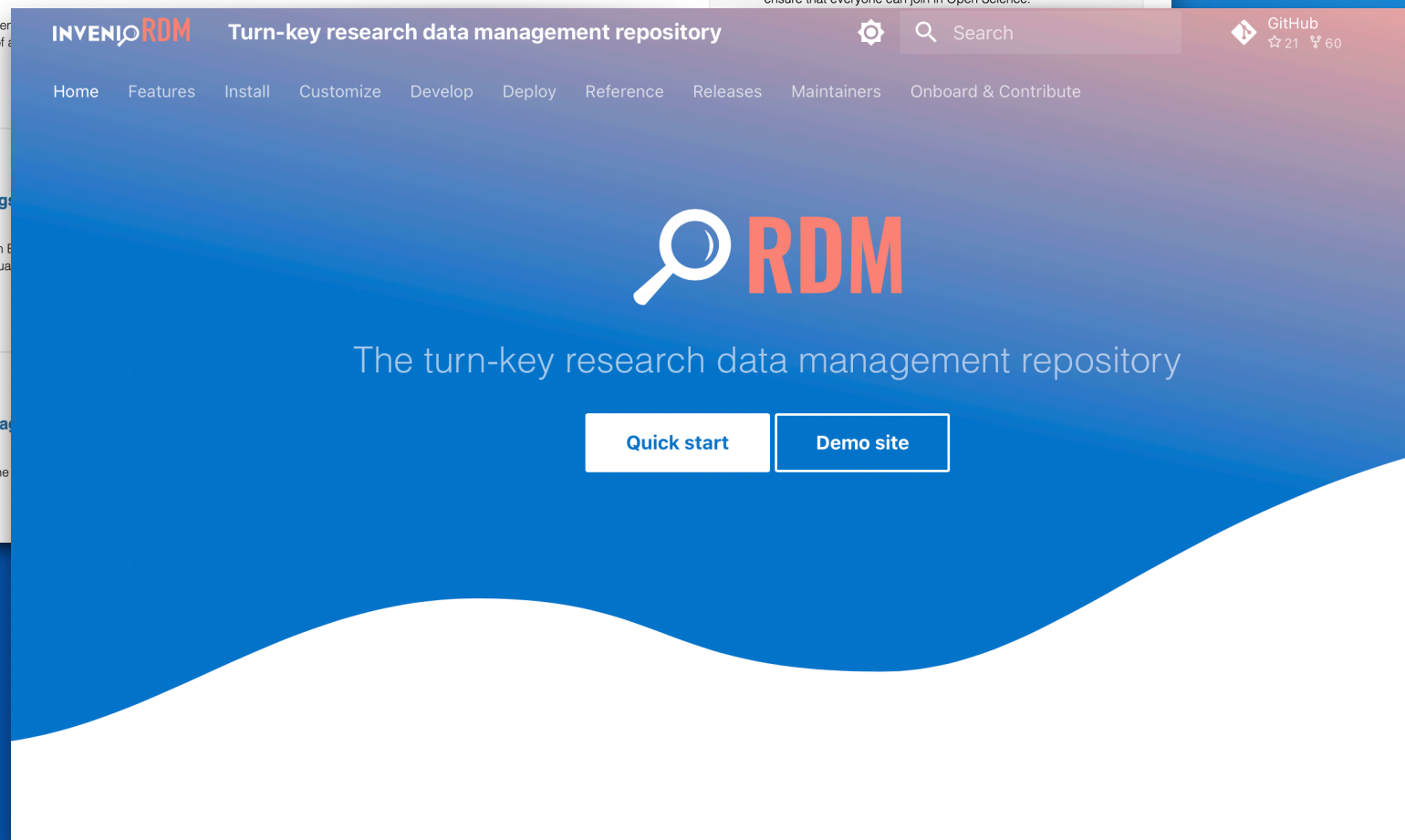
• 25 years building tools for researchers

• 12 years @ CERN  
Head of Open Science Repositories

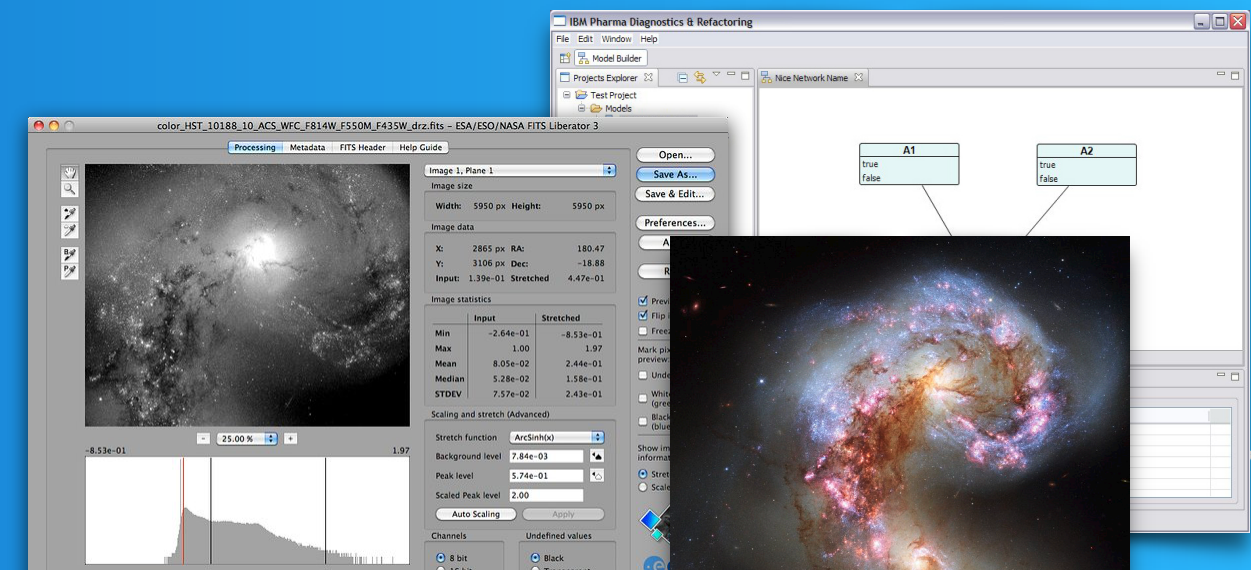
• Software engineer



The screenshot shows the Zenodo website interface. At the top, there is a search bar and navigation links for 'Communities' and 'My dashboard'. The main content area features 'Featured communities' with a prominent 'EU Open Research Repository (Pilot)' card, which includes the European Union flag and a 'Browse' button. Below this, there is a 'Recent uploads' section listing several research outputs, including a poster from July 9, 2024, titled 'Croatian Libraries' Evaluation System' and another titled 'Unveiling Open Science Impact: Findings from PathOS'. A 'Why use Zenodo?' section is also visible, listing benefits like 'Safe' storage and 'Trusted' operation.



The screenshot displays the INVENIO RDM website. The header includes the logo 'INVENIO RDM' and the tagline 'Turn-key research data management repository'. Navigation links for 'Home', 'Features', 'Install', 'Customize', 'Develop', 'Deploy', 'Reference', 'Releases', 'Maintainers', and 'Onboard & Contribute' are provided. The main visual is a large blue and white graphic with a magnifying glass icon and the text 'RDM The turn-key research data management repository'. Two buttons, 'Quick start' and 'Demo site', are positioned at the bottom of the graphic.



This block contains two overlapping screenshots of astronomical software. The foreground window is 'FITS Liberator 3', showing a grayscale image of a galaxy with various processing parameters and statistics. The background window is 'IBM Pharma Diagnostics & Refactoring', which displays a network diagram with nodes labeled 'A1' and 'A2' and a corresponding colorized image of a galaxy.

zenodo

**400.000 users**

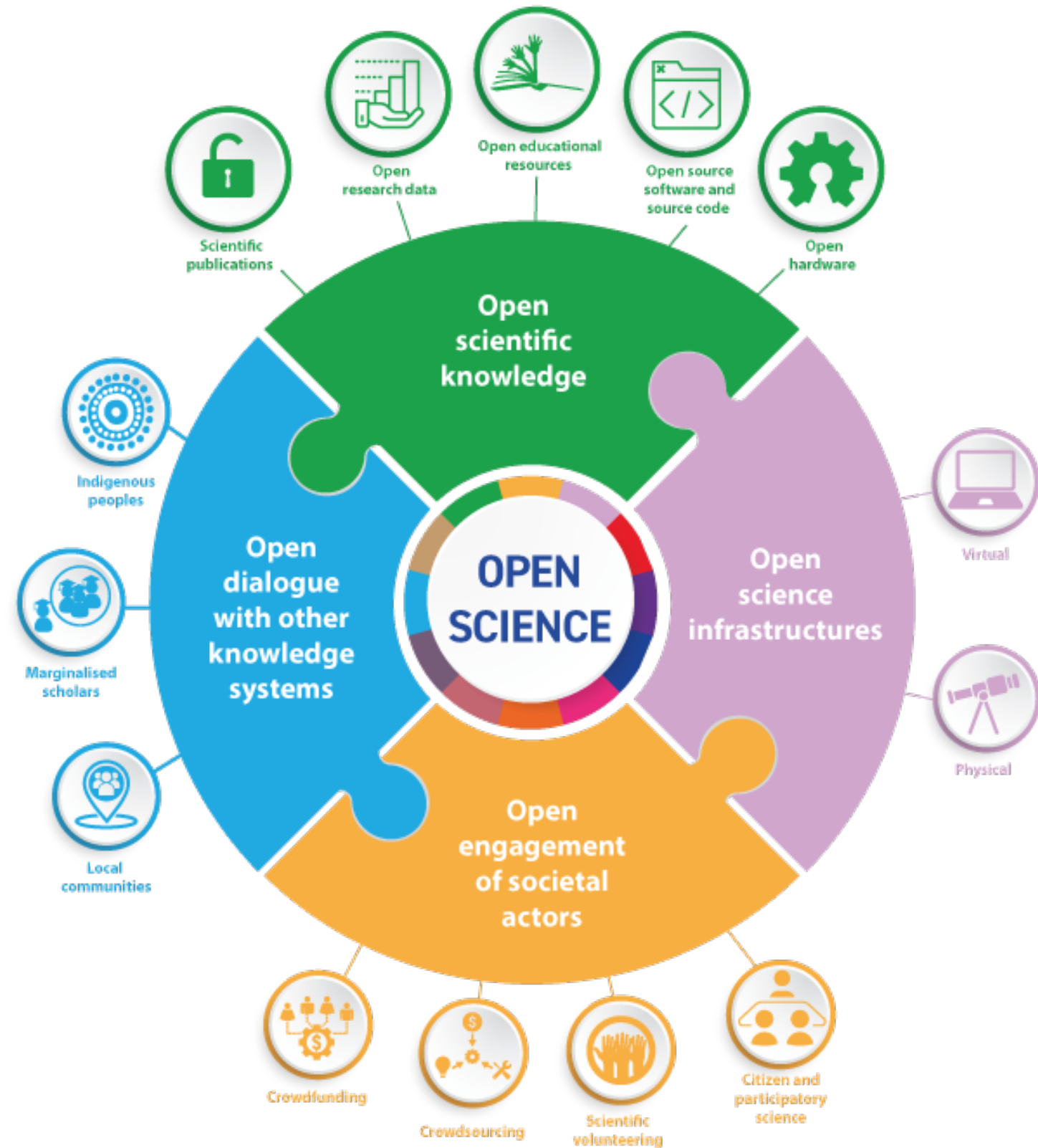
**90000 organisations**

**161 countries**



# Open Science

# Science



Open Science is a critical  
accelerator for the achievement of  
the UN Sustainable Development  
Goals

UNESCO

# Overview

## Publications

- Scientific publishing
- Copyright / licensing
- Open access
- Publishing pitfalls
- Information sources

## Data / Software / ...

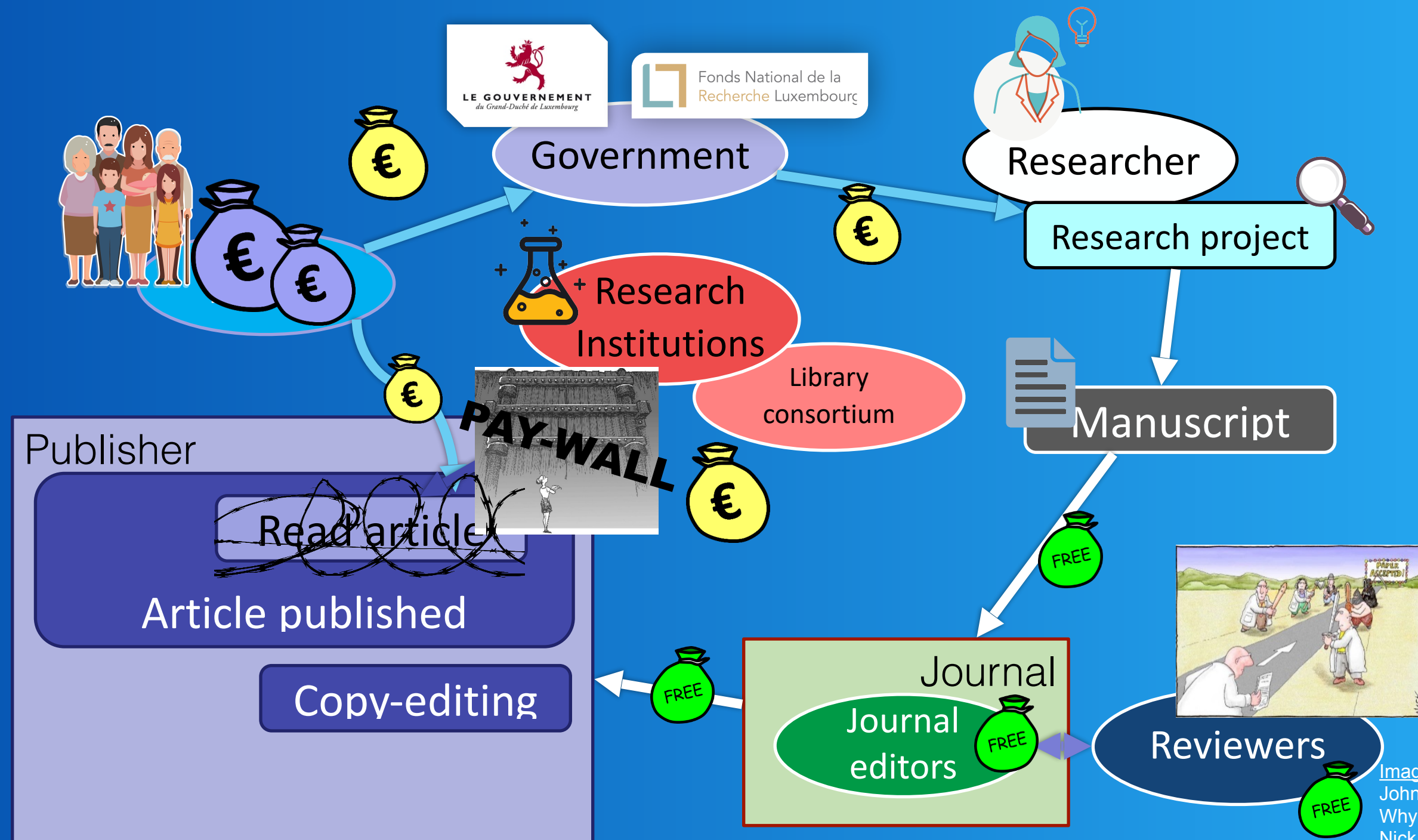
- Open data case studies
- FAIR Principles
- Persistent identifiers & metadata
- Data publishing 101

# Scientific publishing, copyright & licensing

# Publishing and double dipping

Read

Write



Images:  
John R. McKiernan,  
Why Open Research?  
Nick Kim, Science and  
Ink

# Why

© 2022 Elsevier B.V. All rights reserved.



# Why

© 2022 Elsevier B.V. All rights reserved.

# Why

[JOURNAL NAME]

Published by Wiley on behalf of \_\_\_\_\_ (the "Owner" of the Journal)

or

Published by Wiley (the "Owner" of the Journal)

or

Published by Wiley and \_\_\_\_\_ (together the "Owner" of the Journal)

## COPYRIGHT TRANSFER AGREEMENT

Date:

Responsible Corresponding Author (the "Author") name:

Author email address:

Manuscript number:

Re: Manuscript or work entitled \_\_\_\_\_ (the "Contribution")



for publication in \_\_\_\_\_ (the "Journal")

published by \_\_\_\_\_ ("Wiley")

Dear Author:

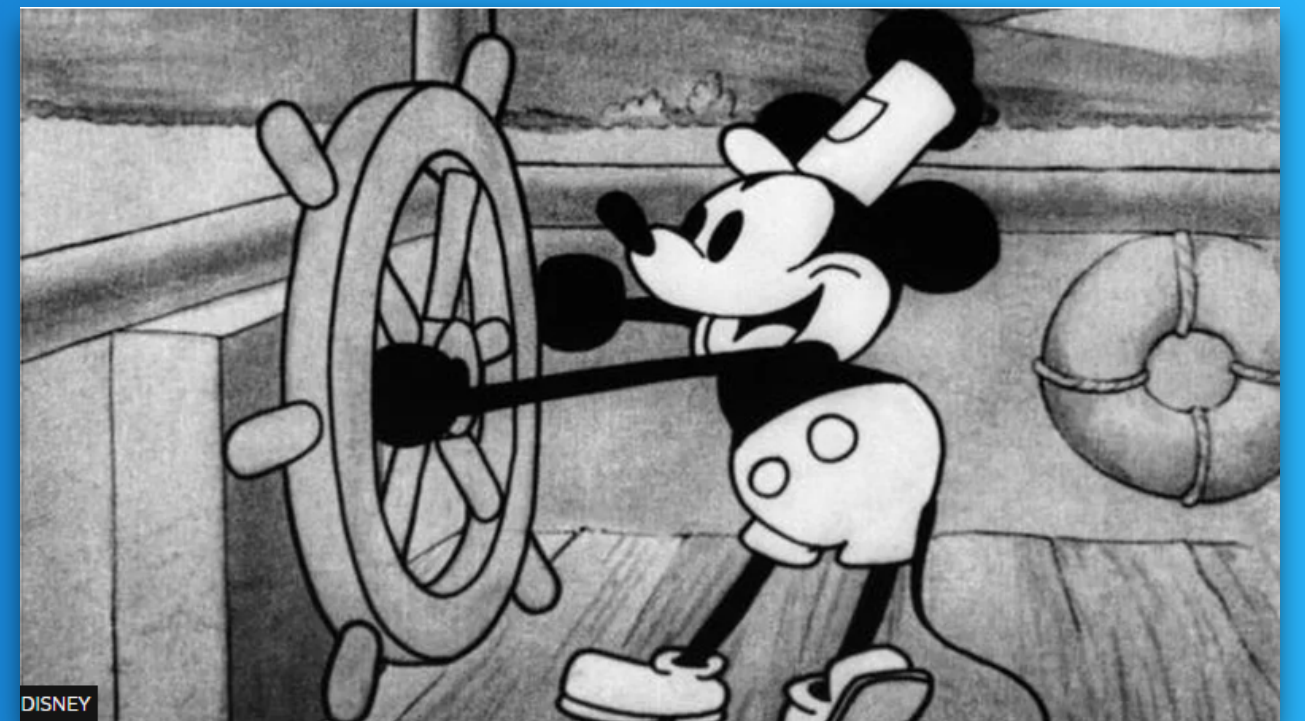
Thank you for submitting your Contribution for publication. In order to expedite the editing and publishing process and enable Wiley to disseminate your Contribution to the fullest extent, we need to have this Copyright Transfer Agreement (the "Agreement") executed. If there are any co-authors of the Contribution ("Co-author"), you must obtain each Co-author's consent to the terms of this Agreement (including the rights granted to Owner) and obtain their signed written permission to execute this Agreement on behalf of the Co-author(s), and you must provide the written permission on request by the Owner or Wiley (where Wiley is not the Owner). If there are no such Co-authors, terms related to Co-author(s) in this Agreement do not apply. If the Contribution is not accepted for publication, or if the Contribution is subsequently rejected before publication, this Agreement will be null and void. **Publication cannot proceed without a signed copy of this Agreement.**

# Copyright

- **Creative work:** Any creative/original work
  - Scientific articles, software, ... 
  - Facts 
- **Copyright holder:** Must be legal entity (person/organisation)
- Copyright is automatic.
- Employment contracts might mean your employer owns your work
- Rights are usually territorial. Copyright usually expires after

# Public domain

- **No exclusive intellectual property rights**
  - Copyright expired
  - Expressly waived - Creative Commons CC Zero (CC0)
  - Inapplicable
- **Examples:**
  - Shakespeare, Beethoven



# Licenses

- **License:** A permission from the rights owner to do X, Y, Z... given specific conditions.
- Examples of rights: Use, Redistribute, Adapt, ...
- Examples of conditions: Attribution, Non-commercial, ...

# Why are CERN images not on Wikipedia?

## Terms of Use for CERN Audiovisual Media

Use of CERN audiovisual media denotes agreement with the following terms:

1. CERN provides the image free of charge for educational and informational use.
2. The image is provided “as-is” and the user shall hold CERN free and harmless in connection with its use.
3. CERN is to be credited as the source of the image.
4. CERN retains copyright in the image. Download and use of the image does not amount to a transfer of intellectual property.
5. The image may not be used in a misleading, inappropriate or offensive manner, in a military context, in advertisement or in a manner that suggests any kind of endorsement by CERN or its personnel.
6. The image may not be sold, distributed or otherwise made available for use by third parties.
7. The CERN logo is legally protected. CERN’s prior written approval shall be obtained for its use or for the use of any material featuring the logo.
8. CERN reserves the right to alter or delete images without notice.

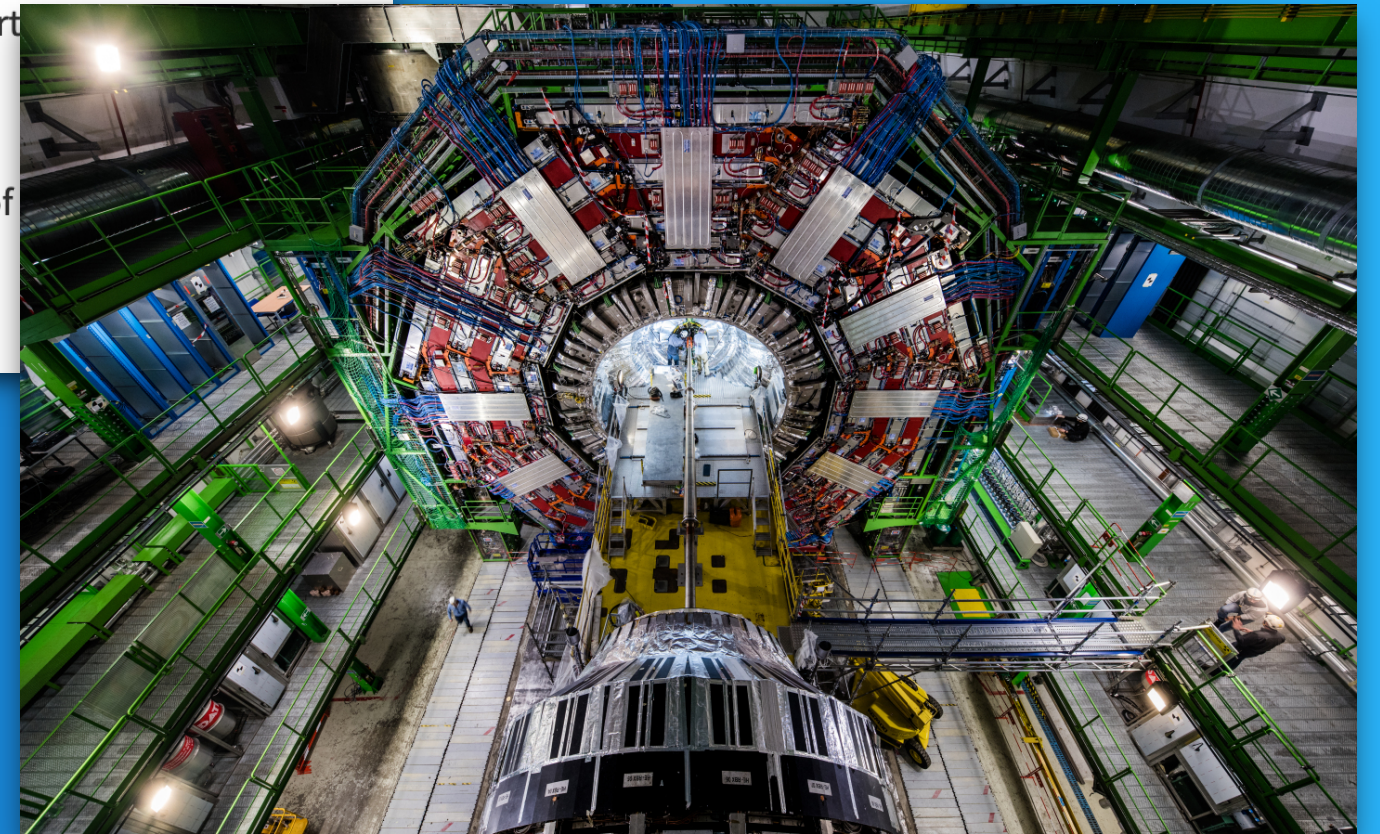


Image: Copyright (C) 2017 CERN

# Standard licenses

**LICENSES**

**MOST FREE**

**ATTRIBUTION**  
**CC BY**  
This license lets you distribute, remix, tweak, and build upon the original work, even commercially, as long as you credit the original creation. This is the most accommodating of licenses offered.

**ATTRIBUTION-SHAREALIKE**  
**CC BY-SA**  
This license lets you remix, tweak, and build upon the original work even for commercial purposes, as long as you credit the original work and license your new creations under the identical terms. This license is often compared to "copyleft" free and open source software licenses. All new works based on the work should carry the same license, so any derivatives will also allow commercial use. This is the license used by Wikipedia.

**ATTRIBUTION-NODERIVS**  
**CC BY-ND**  
This license allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to the original work.

**ATTRIBUTION-NONCOMMERCIAL**  
**CC BY-NC**  
This license lets you remix, tweak, and build upon the original work non-commercially. Your new works must be non-commercial and acknowledge the original work, but you don't have to license your derivative works on the same terms.

**ATTRIBUTION-NONCOMMERCIAL-SHAREALIKE**  
**CC BY-NC-SA**  
This license lets you remix, tweak, and build upon the original work non-commercially, as long as you credit the original work and license your new creations under the identical terms.

**ATTRIBUTION-NONCOMMERCIAL-NODERIVS**  
**CC BY-NC-ND**  
This license is the most restrictive of the six main licenses, only allowing you to download the original work and share it with others as long as you credit the original work. You can't change the original work in any way or use it commercially.

**LEAST FREE**

THIS WORK IS LICENSED UNDER  
<http://creativecommons.org/licenses/by-sa/3.0/>

**foter**

- Ensures lawyers understand the terms.
- Limits tried and tested in courts worldwide.
- For text/visuals/audio:
  - Creative Commons
- For software:
  - MIT License
  - Apache v2 license
  - GPL v3 license

Retain your rights!

License your work to  
allow others to use it!



# Choose an open source license

An open source license protects contributors and users. Businesses and savvy developers won't touch a project without this protection.

{ Which of the following best describes your situation? }

## I need to work in a community.

Use the **license preferred by the community** you're contributing to or depending on. Your project will fit right in.

If you have a dependency that doesn't have a license, ask its maintainers to **add a license**.

## I want it simple and permissive.

The **MIT License** is short and to the point. It lets people do almost anything they want with your project, like making and distributing closed source versions.

**Babel**, **.NET**, and **Rails** use the MIT License.

## I care about sharing improvements.

The **GNU GPLv3** also lets people do almost anything they want with your project, *except* distributing closed source versions.

**Ansible**, **Bash**, and **GIMP** use the GNU GPLv3.

{ What if none of these work for me? }

## My project isn't software.

**There are licenses for that.**

## I want more choices.

**More licenses are available.**

## I don't want to choose a license.

**Here's what happens if you don't.**

# Open access

Free and open access to research without barriers

# Open access

## Green Open Access

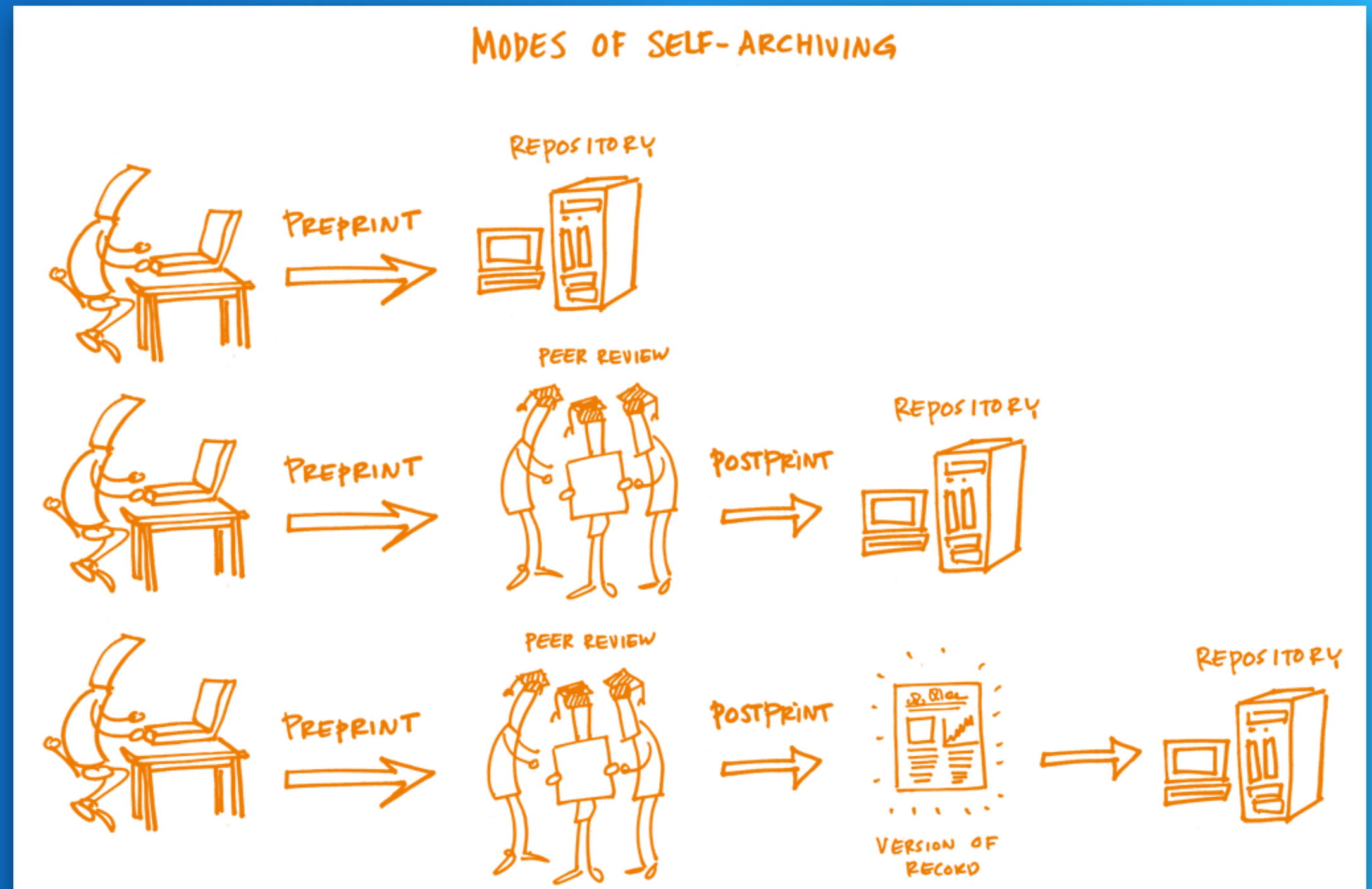
- Copyright transfer to publisher.
- Self-archiving of author version in a repository
- Embargos (6-24 months)
- “Free to read”

## Gold Open Access

- Authors retain copyright.
- Article is licensed for use.
- APC (Article Processing Charges)- pay to publish
  - Nature APC: US\$ 12k !!

# Green Self-archiving

- **Pre-print**
  - Not peer-reviewed
- **Post-print**  
(author accepted manuscript)
  - Peer-reviewed
- **Version of record**  
(publisher version)
  - Typeset/Copyedit



# Green Which journal to publish in?

**JOURNAL CHECKER TOOL**

Which publishing options are supported by your funder's policy?

JOURNAL MY FUNDER MY INSTITUTION

By ISSN or title + By funder name + By ROR or name

No affiliation

**Plan S**  
Making full & immediate  
Open Access a reality

SEND

<https://journalcheckertool.org/>

Jisc Sherpa Services  
Under Active Development

Menu

Our latest update to the new Sherpa Services site... [See more about this update](#)

## Physics Letters B

Publisher [Elsevier](#) | ISSN 0370-2693 | eISSN 1873-2445

[← Back to search results](#) [Report an error](#)

**Journal Policy** Open Access Compliance Checker Transitional Agreement Look-up Journal Details Record Information

Version:

Show all  Published  Accepted  Submitted

Published	Option A	▼
Accepted	Option A	▼
Submitted	Option A	▼

**Policy Links**

[Physics Letters B SCOAP3 model now reality!](#)

<https://v2.sherpa.ac.uk/romeo/>

# Mandates

**CERN authors<sup>†</sup> are required to publish all of their peer-reviewed primary research articles<sup>‡</sup> open access (by default under a Creative Commons attribution license, i.e. CC-BY-4.0).**

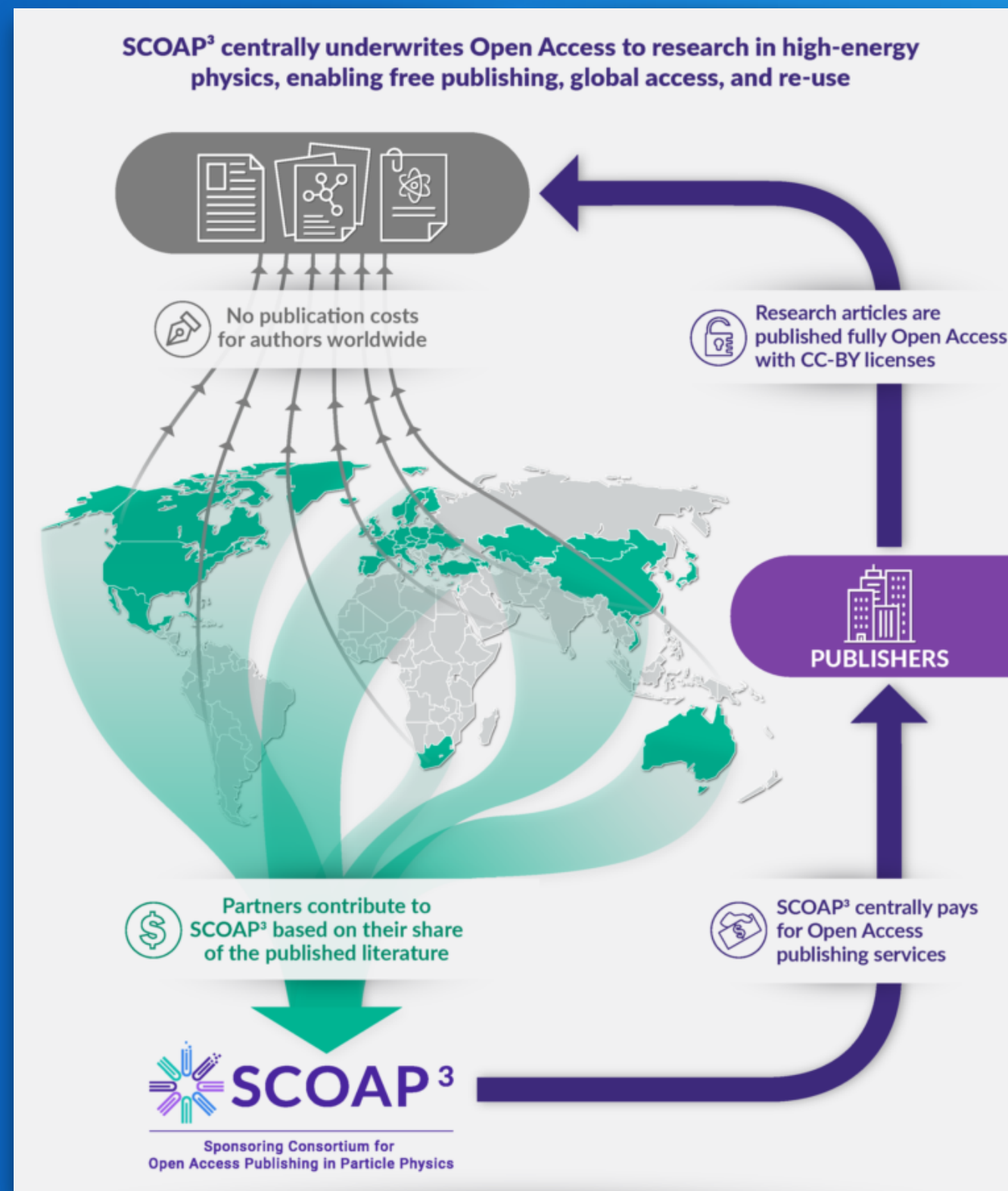
Source: Open Access Policy for CERN Publications

## *Article II* **Purposes**

1. The Organization shall provide for collaboration among European States in nuclear research of a pure scientific and fundamental character, and in research essentially related thereto. The Organization shall have no concern with work for military requirements and the results of its experimental and theoretical work shall be published or otherwise made generally available.

Source: CERN Convention (1954)

# Gold APCs in High Energy Physics



<https://scoap3.org>

# Publishing pitfalls



# Predatory publishers

- Fake editorial boards
- No peer review
- Submission mills
- Scams
- Hijacked journals

DOAJ OPEN GLOBAL TRUSTED

SEARCH DOCUMENTATION ABOUT

DIRECTORY OF OPEN ACCESS JOURNALS

Find open access journals & articles.

Journals  Articles

In all fields SEARCH

80 LANGUAGES | 134 COUNTRIES REPRESENTED | 13,604 JOURNALS WITHOUT FEES | 20,625 JOURNALS

<https://doaj.org>



## Are you submitting your research to a trusted journal?

Publishing your research results is key to **advancing your discipline** – and your **career** – but with so many journals in your field, how can you be sure that you're choosing a **reputable, trustworthy** journal?



Tips to **confirm** a journal's credentials and decide if it will help you **reach** the right audience with your research, and make an **impact** on your career.

Take control of your career at  
**thinkchecksubmit.org**

<https://thinkchecksubmit.org>

# Predatory publishers

## You get an unsolicited email...

*Dear [redacted],*

*I am writing on behalf of the International publishing house, LAP Lambert Academic Publishing.*

*In the course of a research on the [redacted school name], I came across a reference to your thesis on "[redacted dissertation name]". We are an International publisher whose aim is to make academic research available to a wider audience.*

*LAP would be especially interested in publishing your dissertation in the form of a printed book.*

*Your reply including an e-mail address to which I can send an e-mail with further information in an attachment will be greatly appreciated.*

*I am looking forward to hearing from you.*


–

*Kind regards/Freundliche Grüße*


*Ms. Elena Alexei*

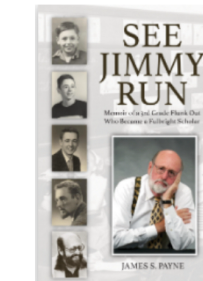
*Acquisition Editor*

*LAP LAMBERT Academic Publishing AG & Co. KG*

**Dr. Nielsen, L. H., your published work "Use Cases\_Zenodo" **

**Dear Dr. Nielsen, L. H.,**

I am  representing Generis Publishing, and I am reaching out to you regarding your published work. We are interested in exploring the possibility of collaborating on a project that expands upon the valuable research you have conducted when writing **"Use Cases\_Zenodo"**.



Our proposal entails the publication of a book that provides a comprehensive and structured coverage of the topic you have explored. Rather than duplicating the content you have already published, we aim to create a printed book that offers fresh insights and a more extensive examination of the subject matter. We believe this would be a compelling opportunity to showcase your expertise and contribute to the existing knowledge in your field.

What do you think?

# Predatory publishers


Information Discussion (0) Files

## Thesis

Report number	CERN-THESIS-2008-135 ; CMS-TS-2008-010
Title	<b>Study of Flavour Changing Neutral Currents in top quark decays with the CMS detector</b>
Author(s)	<a href="#">Benucci, Leonardo</a> (Pisa U.)
Imprint	268 p.
Notes	PhD : Pisa U. : 2008
Thesis supervisor(s)	Tonelli, Guido
Note	Presented on Dec 2007
Subject category	Detectors and Experimental Techniques
Accelerator/Facility, Experiment	<a href="#">CERN LHC ; CMS</a>
Keywords	<a href="#">Physics</a>
Other source	<a href="#">Inspire</a>

Record created 2010-12-02, last modified 2019-05-31

Fulltext:

 PDF


Credit: Jens Vigen (CERN)

amazon.fr prime Livrer à Lars Sergy 01630 Toutes nos catégories Rechercher Amazon.fr

Bonjour Lars Compte et listes Retours et commandes Panier


## Prime Day 16-17 juillet

Livres anglais et étrangers Recherche détaillée Nos rubriques Nouveautés Meilleures ventes Bonnes affaires Livres audio Tous les livres Vendez !

 Livre de coloriage des mandalas: 50 motifs relaxants par 13 artistes, coloration de présence attentive pour les adultes, volume 1 ★★★★★ 120 11<sup>97</sup>€

Sponsorisé

Livres > Sciences, Techniques et Médecine > Physique - Sciences de la matière

 **Flavour Changing Neutral Currents in top quark decays: A Monte-Carlo study of a new physics interaction in top quark decays, performed with CMS detector at LHC** Broché – 10 avril 2009

Édition en Anglais | de [Leonardo Benucci](#) (Auteur) [Afficher tous les formats et éditions](#)

**Options d'achat et paniers Plus**

**Paiement en plusieurs fois**  
À partir de 19,92 € x 4 paiements (frais de 2.3% inclus)

This work contains an estimation of the observability of the Flavour Changing Neutral Currents (FCNC) in top decays with the CMS experiment at the future Large Hadron Collider (LHC). Since expected branching ratios for top FCNC in the Standard Model are eagerly low, any experimental evidence for a top quark FCNC interaction would signal the existence of physics beyond the Standard Model. A wide variety of Standard Model processes have been considered into background, and selection is optimized in order to maximize the significance in the signal region. A full set of systematic effects, originating from detector or theoretical uncertainties, are added to the simulation and their impact on the analysis is established. Results are presented for several background levels and different experimental conditions, then extrapolated to the highest attainable LHC luminosities. An improvement of two orders of magnitude in sensitivity to FCNC branching ratio is obtained, allowing to shed light on different new physics scenarios.

[Signaler un problème avec ce produit](#)

Broché 77,89 €

Autres offres Neuf

Livraison Retrait

77<sup>89</sup>€

Les prix des articles vendus sur Amazon incluent la TVA. En fonction de votre adresse de livraison, la TVA peut varier au moment du paiement. Pour plus d'informations, Veuillez voir les [détails](#). [Retours GRATUITS](#)

Livraison à 0,01 € vendredi 12 juillet. Commandez dans les 7 h 37 min. [Détails](#)

© Livrer à Lars - Sergy 01630

En stock

Quantité : 1

Ajouter au panier

Acheter cet article

Expédié par Amazon

# Information sources

# INSPIRE HEP

The screenshot shows the INSPIRE HEP website homepage. At the top left is the logo 'iNSPIRE HEP'. To the right are links for 'Help', 'Submit', and 'Login'. Below this is a navigation bar with 'Literature', 'Authors', 'Jobs', 'Seminars', 'Conferences', and 'More...'. The main heading is 'Discover High-Energy Physics Content', followed by a sub-heading: 'INSPIRE is a trusted community hub that helps researchers to share and find accurate scholarly information in high energy physics.' Below this is a search bar with a dropdown menu set to 'literature' and a search icon. A link 'How to search?' is positioned below the search bar. The section 'BROUGHT TO YOU BY' features logos for CERN, DESY, Fermilab, and SLAC. A 'Feedback' button is on the right side. The 'News and updates' section contains a notice titled 'New contact procedure' dated 18/10/2023.

- 1.6M bibliographic records
- 700k full-text
- Jobs, seminars, conferences

<https://inspirehep.net/>

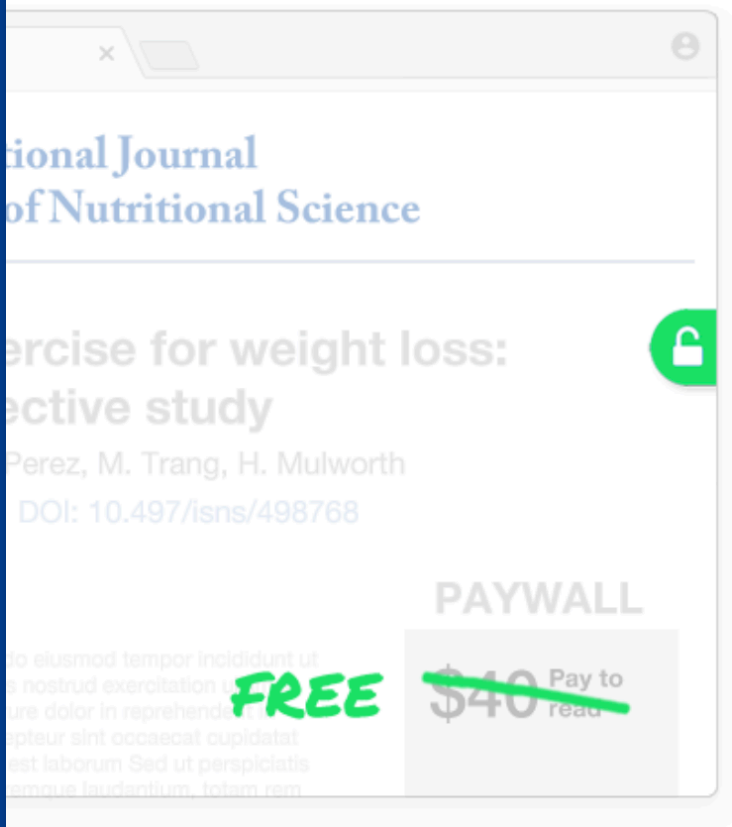
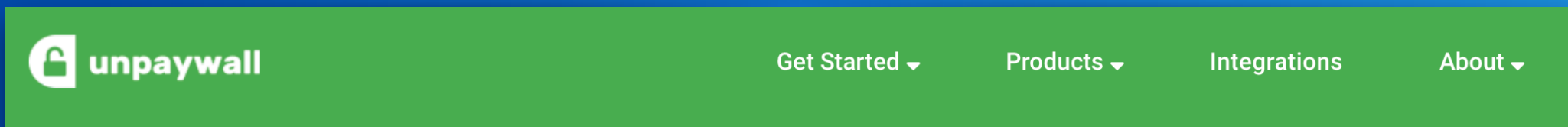
# NASA ADS

- 15M bibliographic records
- Astronomy, astrophysics, planetary sciences (soon)
- Tracks citations and usage of records

The screenshot displays the NASA ADS website interface. At the top, there is a navigation bar with the 'ads' logo, 'Feedback', 'ORCID', 'About', 'Sign Up', and 'Log In' links. Below this is a header for the 'astrophysics data system' with tabs for 'Classic Form', 'Modern Form', and 'Paper Form'. The main search area includes a 'QUICK FIELD:' dropdown menu with options like 'Author', 'First Author', 'Abstract', 'Year', 'Fulltext', and 'All Search Terms'. A search input field is present with a magnifying glass icon. Below the search field, there are two columns of search examples: 'Recommendations' and 'Search examples'. The 'Recommendations' column includes fields for 'author' (author:"Wizinowich, Peter"), 'first author' (author:"^Encrenaz, Therese"), 'abstract + title' (abs:"dark energy"), 'year' (year:2000), 'year range' (year:2000-2005), 'full text' (full:"super Earth"), 'publication' (bibstem:ApJ), and 'citations' (citations(abstract:JWST)). The 'Search examples' column includes fields for 'refereed' (property:refereed), 'astronomy' (collection:astronomy), 'exact search' (=body:"intracluster medium"), 'institution' (inst:CfA), 'author count' (author\_count:[1 TO 10]), 'record type' (doctype:software), 'newly ingested' (entdate:[NOW-7DAYS TO NOW]), and 'eprint' (property:"eprint\_openaccess"). At the bottom, there is a footer with copyright information, contact details, and links for 'Resources', 'Social', and 'Project'.

<https://ui.adsabs.harvard.edu/>

# Unpaywall / OpenAlex



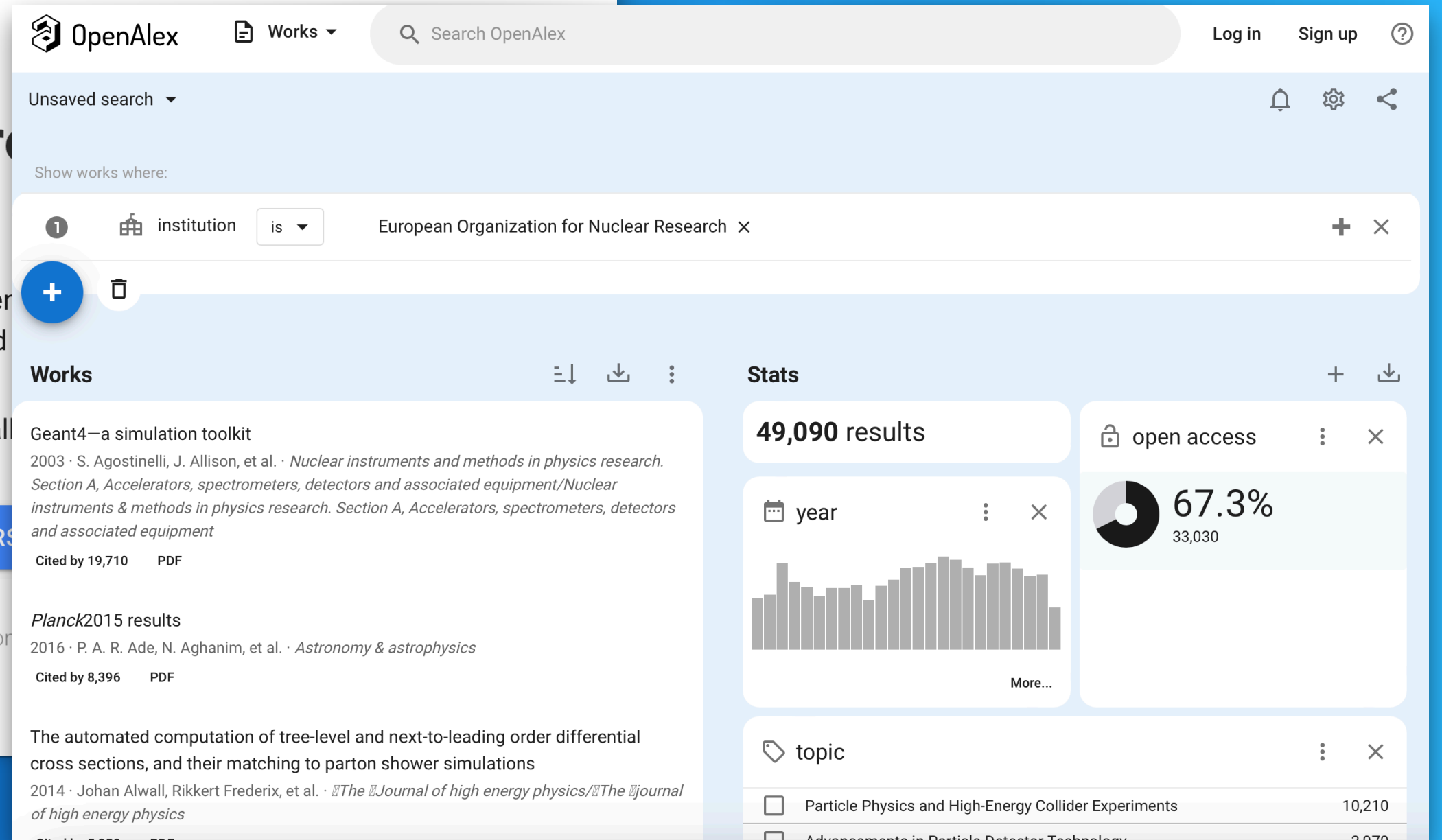
Read research  
free.

Click the green  
peer-reviewed

The Unpaywall

SEND YOURS


600,000+ users or



<https://unpaywall.org>

<https://openalex.org/>

# INIS, SCOAP3, arXiv, Library catalogue ...



arXiv is a free distribution service and an open-access archive for nearly 2.4 million scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics. Materials on this site are not peer-reviewed by arXiv.

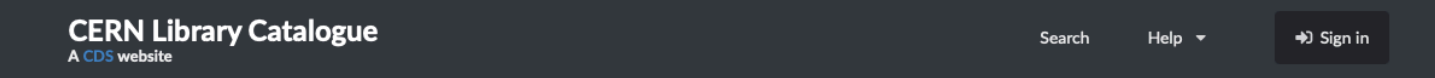
arXiv News  
Stay up to date with what is happening at arXiv.

Latest news

Subject search and browse:  
Physics

- ### Physics
- Astrophysics (astro-ph)
  - Instrumentation and Methods
  - Condensed Matter (cond-mat)
  - Soft Condensed Matter; Statistical Mechanics
  - General Relativity and Quantum Cosmology
  - High Energy Physics - Experiment
  - High Energy Physics - Lattice
  - High Energy Physics - Phenomenology
  - High Energy Physics - Theory
  - Mathematical Physics (math-ph)
  - Nonlinear Sciences (nlin)
  - includes: Adaptation and Human Factors
  - Nuclear Experiment (nucl-ex)
  - Nuclear Theory (nucl-th)
  - Physics (physics new, recent)
  - includes: Accelerator Physics; Computational Physics; Data Analysis; Detector Physics; Optics; Physics and Instrumentation
  - Quantum Physics (quant-ph)

### Mathematics



CERN Library Catalogue  
A CDS website

We have released new features! [Click here](#) to read the blog post and discover all the details.


## CERN Library Catalogue

Books, e-books, journals, standards at CERN.

Search for books, e-books, series, journals and standards.

Recent books | Recent journals

VIEW ALL



IAEA NUCLEUS


IAEA 50+ years of INIS International Nuclear Information System

Home INIS Home Thesaurus Browse

## Search the INIS Repository

Enter your search term here

Latest Records | Advanced Search



SCOAP<sup>3</sup> Home SCOAP<sup>3</sup> project Partners About Help Documentation Login

## SCOAP<sup>3</sup> Repository

Search 66924 Open Access articles:

Type and press enter to search

Journals SCOAP<sup>3</sup> partners

Acta Physica Polonica B	169
Advances in High Energy Physics	1126
Chinese Physics C	810
European Physical Journal C	10187
Journal of Cosmology and Astroparticle Physics	654
Journal of High Energy Physics	24314
New Journal of Physics	25
Nuclear Physics B	3269
Physical Review C	572
Physical Review D	14425
Physical Review Letters	1827
Physics Letters B	8664
Progress of Theoretical and Experimental Physics	882

Contact Us Disclaimer  
Copyright © 2022 International Atomic Energy Agency (IAEA). All rights reserved.  
v9.1.0.20240115



# Break

Retain your rights!

License your work to allow others to use it!

# Open data, software, ...

Research data management (RDM)

Very important!  
**LAPTOP LOST**  
in the bus 345



(silver macbook pro, lost in the bus, line 345, at South Kensington station on  
friday 16<sup>th</sup> at 7am, within a black bag also containing my ID card)

**CRUCIAL** scientific data  
+ many **YEARS** of  
research work inside!

please bring it back to Imperial College (Prince consort road, between the  
museums and Hyde park) or **CALL** me to see how we can proceed:

020-75-94-11-55  
or  
0033-6-07-67-84-04

Very important!





Credit: By Bryan Tong Minh / CC-BY-2.5 ([http://commons.wikimedia.org/wiki/File:Brand\\_bouwkunde\\_-\\_TU\\_Delft\\_-\\_13\\_Mei\\_2008.jpg](http://commons.wikimedia.org/wiki/File:Brand_bouwkunde_-_TU_Delft_-_13_Mei_2008.jpg))



**Are you sure you want to  
permanently erase the items in  
the Bin?**

You can't undo this action.

Cancel

Empty Bin

# Example 1

# LHC Open Data

- Data behind plots in publications
- Data for outreach/education
- Reconstructed data
- Raw data

Level 1

MB

Level 2

GB

Level 3

PB

Level 4

EB

# LHC Open Data

- Data behind plots in publications
- Data for outreach/education
- Reconstructed data
- Raw data

Level 1

MB

Level 2

GB

Level 3

PB

Level 4

EB



# HEPData - Level 1

$p_T$ [GeV]	10 < W < 30 GeV		30 < W < 50 GeV	
	$\langle p_T \rangle$ [GeV]	$d\sigma/dp_T$ [pb/GeV]	$\langle p_T \rangle$ [GeV]	$d\sigma/dp_T$ [pb/GeV]
0.12–0.28	0.20	$(3.78 \pm 0.01 \pm 0.18) \times 10^4$	0.20	$(1.15 \pm 0.00 \pm 0.03) \times 10^4$
0.28–0.44	0.35	$(3.01 \pm 0.01 \pm 0.13) \times 10^4$	0.35	$(9.01 \pm 0.02 \pm 0.21) \times 10^3$
0.44–0.60	0.51	$(1.74 \pm 0.00 \pm 0.06) \times 10^4$	0.51	$(5.26 \pm 0.02 \pm 0.13) \times 10^3$
0.60–0.80	0.69	$(8.43 \pm 0.03 \pm 0.29) \times 10^3$	0.69	$(2.69 \pm 0.01 \pm 0.07) \times 10^3$
0.80–1.00	0.89	$(3.62 \pm 0.02 \pm 0.16) \times 10^3$	0.89	$(1.22 \pm 0.01 \pm 0.03) \times 10^3$
1.00–1.20	1.09	$(1.58 \pm 0.01 \pm 0.09) \times 10^3$	1.09	$(5.85 \pm 0.05 \pm 0.19) \times 10^2$
1.20–1.40	1.29	$(7.29 \pm 0.08 \pm 0.48) \times 10^2$	1.29	$(2.94 \pm 0.04 \pm 0.11) \times 10^2$
1.40–1.60	1.49	$(3.61 \pm 0.06 \pm 0.25) \times 10^2$	1.49	$(1.59 \pm 0.03 \pm 0.06) \times 10^2$
1.60–1.80	1.69	$(1.92 \pm 0.04 \pm 0.13) \times 10^2$	1.69	$(9.13 \pm 0.21 \pm 0.32) \times 10^1$
1.80–2.00	1.89	$(1.13 \pm 0.03 \pm 0.08) \times 10^2$	1.89	$(5.32 \pm 0.15 \pm 0.19) \times 10^1$
2.00–2.20	2.09	$(6.68 \pm 0.23 \pm 0.44) \times 10^1$	2.09	$(3.34 \pm 0.12 \pm 0.11) \times 10^1$
2.20–2.40	2.29	$(4.17 \pm 0.19 \pm 0.26) \times 10^1$	2.29	$(2.22 \pm 0.10 \pm 0.07) \times 10^1$
2.40–2.60	2.50	$(2.85 \pm 0.16 \pm 0.17) \times 10^1$	2.50	$(1.47 \pm 0.08 \pm 0.04) \times 10^1$
2.60–2.80	2.70	$(1.98 \pm 0.13 \pm 0.12) \times 10^1$	2.70	$(1.00 \pm 0.06 \pm 0.03) \times 10^1$
2.80–3.00	2.90	$(1.45 \pm 0.12 \pm 0.09) \times 10^1$	2.90	$(7.48 \pm 0.54 \pm 0.26) \times 10^0$
3.00–3.50	3.21	$(7.93 \pm 0.56 \pm 0.50) \times 10^0$	3.23	$(4.33 \pm 0.26 \pm 0.15) \times 10^0$
3.50–4.00	3.71	$(3.87 \pm 0.42 \pm 0.27) \times 10^0$	3.73	$(2.32 \pm 0.19 \pm 0.08) \times 10^0$
4.00–5.00	4.40	$(1.63 \pm 0.22 \pm 0.15) \times 10^0$	4.42	$(1.12 \pm 0.09 \pm 0.04) \times 10^0$
5.00–6.00	5.40	$(5.16 \pm 0.78 \pm 0.55) \times 10^{-1}$	5.43	$(5.05 \pm 0.66 \pm 0.19) \times 10^{-1}$
6.00–8.00	6.74 ± 0.01	$(1.37 \pm 0.31 \pm 0.22) \times 10^{-1}$	6.74	$(2.10 \pm 0.33 \pm 0.12) \times 10^{-1}$
8.00–15.00	9.52 ± 0.12	$(1.90 \pm 0.86 \pm 0.33) \times 10^{-2}$	9.62 ± 0.03	$(2.23 \pm 0.60 \pm 0.36) \times 10^{-2}$

Table 1: Differential inclusive charged hadron production cross-sections  $d\sigma/dp_T$  for  $|\eta| < 1.5$  and in the  $W$  ranges  $10 < W < 30$  GeV and  $30 < W < 50$  GeV. The first uncertainty is the statistical uncertainty and the second uncertainty is the systematic uncertainty. No value is given if the error on  $\langle p_T \rangle$  is less than 0.01.

Source: <https://doi.org/10.48550/arXiv.hep-ex/0612045>

The screenshot shows the HEPData interface for the record 'Inclusive production of charged hadrons in photon photon collisions.' The main table displays the following data:

PT [GEV]	D(SIG)/DPT [PB/GEV]
0.12 - 0.28	37800.0 ±100.0 stat ±1800.0 sys
0.35 (bin: 0.28 - 0.44)	30100.0 ±100.0 stat ±1300.0 sys
0.51 (bin: 0.44 - 0.6)	17400.0 ±600.0 sys
0.69 (bin: 0.6 - 0.8)	8430.0 ±30.0 stat ±290.0 sys
0.89 (bin: 0.8 - 1.0)	3620.0 ±20.0 stat ±160.0 sys
1.09 (bin: 1.0 - 1.2)	1580.0 ±10.0 stat ±90.0 sys
1.29 (bin: 1.2 - 1.4)	729.0 ±8.0 stat ±48.0 sys
1.49 (bin: 1.4 - 1.6)	361.0 ±0.0 stat ±16.0 sys

The visualization plot shows the cross-section decreasing as pT increases, with a log scale on the y-axis and a linear scale on the x-axis. The plot includes error bars and a legend for 'Sum errors' and 'Log Scale'.

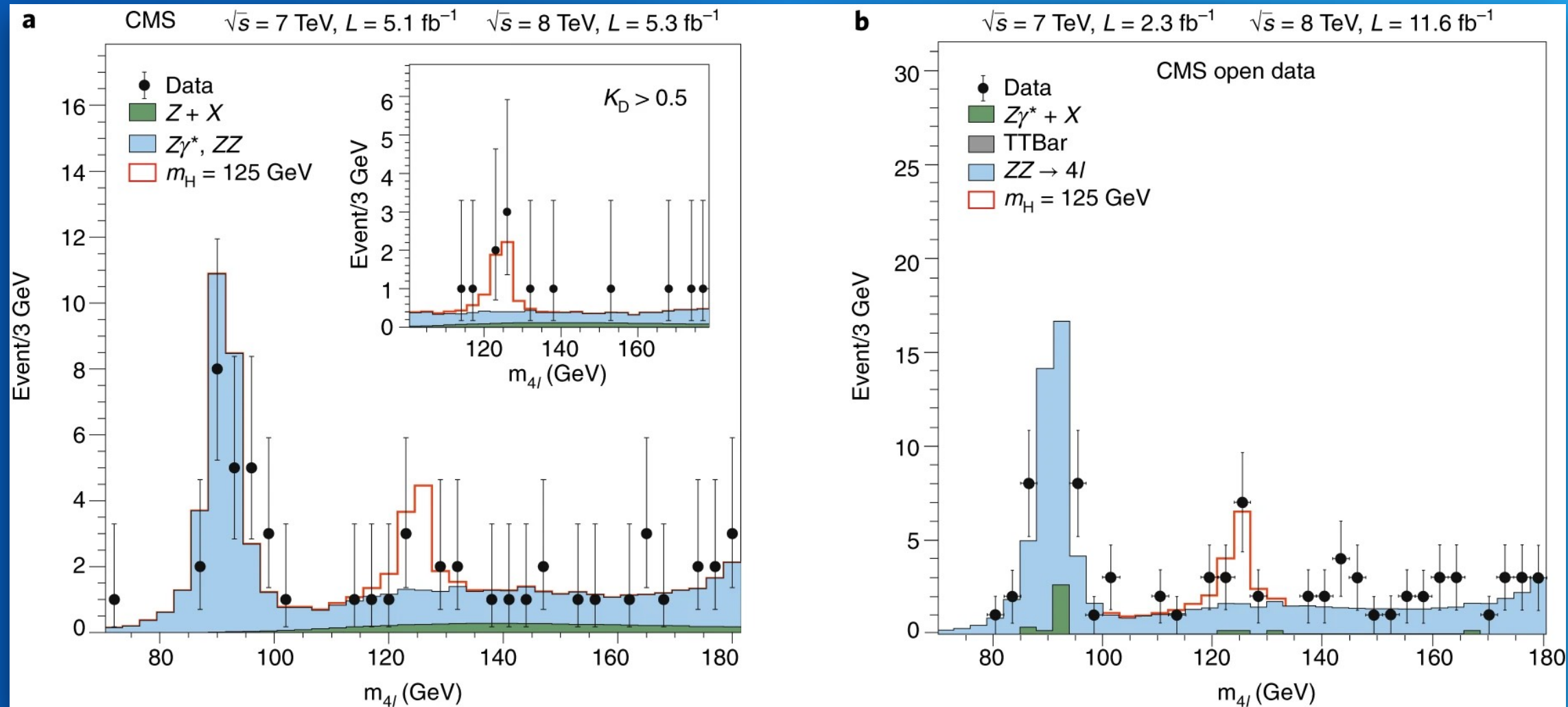
Source: <https://doi.org/10.17182/hepdata.48554>

# CERN Open Data - Level 2/3

The screenshot shows the CERN Open Data website. At the top left is the 'opendata CERN' logo, and at the top right are 'Help' and 'About' dropdown menus. The main heading reads 'Explore more than five petabytes of open data from particle physics!'. Below this is a search bar with a 'Search' button. Under the search bar, there are search examples: 'collision datasets', 'keywords:education', and 'energy:7TeV'. The page is divided into two columns: 'Explore' and 'Focus on'. The 'Explore' column lists links for 'datasets', 'software', 'environments', and 'documentation'. The 'Focus on' column lists links for 'ATLAS', 'ALICE', 'CMS', 'LHCb', 'OPERA', 'PHENIX', and 'Data Science'. The background features a stylized particle detector diagram.

- Data + Software + Virtual Machines + Documentation
- 5 PB of data from all LHC experiments

# CERN Open Data - Level 2



The official CMS result

Researchers + students

Source: Chen, X., Dallmeier-Tiessen, S., Dasler, R. et al. Open is not enough. Nature Phys 15, 113–119 (2019). <https://doi.org/10.1038/s41567-018-0342-2>

# CERN Open Data - Level 3

PHYSICAL REVIEW D  
covering particles, fields, gravitation, and cosmology

Highlights Recent Accepted Collections Authors Referees Search Press About Editorial Team

Editors' Suggestion

## Jet substructure studies with CMS open data

Aashish Tripathy, Wei Xue, Andrew Larkoski, Simone Marzani, and Jesse Thaler  
Phys. Rev. D **96**, 074003 – Published 3 October 2017

11

Twitter Facebook More

Article References Citing Articles (40) PDF HTML Export Citation

### ABSTRACT

We use public data from the CMS experiment to study the two-prong substructure of jets. The CMS open data are based on  $31.8 \text{ pb}^{-1}$  of 7 TeV proton-proton collisions recorded at the Large Hadron Collider in 2010, yielding a sample of 768,687 events containing a high-quality central jet with transverse momentum larger than 85 GeV. Using CMS's particle flow reconstruction algorithm to obtain jet constituents, we extract the two-prong substructure of the leading jet using soft-drop declustering. We find good agreement between results obtained from the CMS open data and those obtained from parton shower generators, and we also compare to analytic jet substructure calculations performed to modified leading-logarithmic accuracy. Although the 2010 CMS open data do not include simulated data to help estimate systematic uncertainties, we use track-only observables to validate these substructure studies.

12 More

Received 9 May 2017

DOI: <https://doi.org/10.1103/PhysRevD.96.074003>

© 2017 American Physical Society

Issue  
Vol. 96, Iss. 7 – 1 October 2017

Reuse & Permissions

Access Options

[Buy Article »](#)

[Log in with individual APS Journal Account »](#)

[Log in with a username/password provided by your institution »](#)

[Get access through a U.S. public or high school library »](#)

Article Available via CHORUS

[Download Accepted Manuscript](#)

- Using released CMS open data from 2011-2012

- Confirmed their jet substructure model predictions

# Reproducible research data analysis

The screenshot displays the reana web interface. At the top left is the reana logo. On the right, there are notification and user icons. The main content area shows a job titled "reana-demo-cms-h4l #1" with a GitHub icon and a status of "running for 44 seconds step 1/4". Below this is a progress bar. A navigation menu includes "Engine logs", "Job logs" (selected), "Workspace", and "Specification". A step summary bar shows "Step: scram" with a dropdown arrow, a green "finished in 20 seconds" badge, and icons for "Kubernetes" and a Docker image "docker.io/cmsopendata/cmssw\_5\_3...". The terminal output below shows the following log entries:

```
job: :  
  WARNING: In non-interactive mode release checks e.g. deprecated releases, production architectures are disabled.  
>> Local Products Rules ..... started  
>> Local Products Rules ..... done  
>> Entering Package HiggsExample20112012/HiggsDemoAnalyzer  
>> Creating project symlinks  
Entering library rule at HiggsExample20112012/HiggsDemoAnalyzer  
>> Compiling edm plugin /var/reana/users/c80ca8cf-228c-4019-b148-1fe91493015e/workflows/33a4e432-9a44-4059-9b92-5e7c74076144/CMSSW_5_3_32/src/HiggsExample20112012/HiggsDemoAnalyzer/src/HiggsDemoAnalyzerGit.cc  
>> Building edm plugin  
tmp/slc6_amd64_gcc472/src/HiggsExample20112012/HiggsDemoAnalyzer/src/HiggsExample20112012HiggsDemoAnalyzer/libHiggsExample20112012HiggsDemoAnalyzer.so  
Leaving library rule at HiggsExample20112012/HiggsDemoAnalyzer  
@@@ Running edmWriteConfigs for HiggsExample20112012HiggsDemoAnalyzer  
--- Registered EDM Plugin: HiggsExample20112012HiggsDemoAnalyzer  
>> Leaving Package HiggsExample20112012/HiggsDemoAnalyzer
```

# Example 2

# Taxonomic treatments

Describe the discovery of new biological species

Example:

Journal article describing 22 new millipedes, published in European Journal of Taxonomy



EJT European Journal of Taxonomy 445: 1–90  
<https://doi.org/10.5852/ejt.2018.445>

This work is licensed under a Creative Commons Attribution 3.0 License.

ISSN 2118-9773  
[www.europeanjournaloftaxonomy.eu](http://www.europeanjournaloftaxonomy.eu)  
2018 · Enghoff H.

Monograph

[urn:lsid:zoobank.org/pub:852A3F68-B728-413A-B12E-56F306D56C35](https://zoobank.org/pub:852A3F68-B728-413A-B12E-56F306D56C35)

**A mountain of millipedes VII: The genus *Eviulisoma* Silvestri, 1910, in the Udzungwa Mountains, Tanzania, and related species from other Eastern Arc Mountains. With notes on *Eoseviulisoma* Brolemann, 1920, and *Suohelisoma* Hoffman, 1963 (Diplopoda, Polydesmida, Paradoxosomatidae)**

Henrik ENGHOFF

Natural History Museum of Denmark, University of Copenhagen,  
Universitetsparken 15, DK-2100 København Ø, Denmark.

Email: [henghoff@snm.ku.dk](mailto:henghoff@snm.ku.dk)

[urn:lsid:zoobank.org/author:FB09A817-000D-43C3-BCC4-2BC1E5373635](https://zoobank.org/author:FB09A817-000D-43C3-BCC4-2BC1E5373635)

**Abstract.** Twenty-two new species of the genus *Eviulisoma* Silvestri, 1910, from the Eastern Arc Mountains, Tanzania, are described: *E. acaciae* sp. nov., *E. aequilobatum* sp. nov., *E. akkariae* sp. nov., *E. angulatum* sp. nov., *E. articulatum* sp. nov., *E. biquintum* sp. nov., *E. breviscutum* sp. nov., *E. cetafi* sp. nov., *E. chitense* sp. nov., *E. commelina* sp. nov., *E. coxale* sp. nov., *E. ejti* sp. nov., *E. grumslingslak* sp. nov., *E. kalimbasiense* sp. nov., *E. navuncus* sp. nov., *E. nessiteras* sp. nov., *E. ottokrausi* sp. nov., *E. paradisiacum* sp. nov., *E. sternale* sp. nov. and *E. zebra* sp. nov. from the Udzungwa Mts, *E. culter* sp. nov. from the Rubeho Mts and *E. kangense* sp. nov. from the Kanga Mts. *Eviulisoma kwabuniense* Kraus, 1958, and *E. dabagaense* Kraus, 1958, both from the Udzungwa Mts, are redescribed based on new material. Notes are provided on *E. iuloideum* (Verhoeff, 1941) based on type material. *Eoseviulisoma* Brolemann, 1920, is synonymized under *Eviulisoma*, based on newly collected material of *E. julinum* (Attems, 1909), type species of *Eoseviulisoma*. New material of *Suohelisoma ulugurensis* Hoffman, 1964, type species of *Suohelisoma* Hoffman, 1964, has revealed that the gonopod structure is more similar to that of *Eviulisoma* than originally thought, but *Suohelisoma* is retained as a valid genus. Four species groups are recognized among *Eviulisoma* species from the Udzungwa Mts, but the need for a revision of the entire genus is emphasized. Two types of epizootic fungi are recorded from *Eviulisoma* spp., and an enigmatic amorphous mass, which may be a kind of plugging substance, is recorded from the gonopod tips and excavated sixth sternum of several species.

**Keywords.** Taxonomy, new species, epizootic fungi, copulatory plug.

Enghoff H. 2018. A mountain of millipedes VII: The genus *Eviulisoma* Silvestri, 1910, in the Udzungwa Mountains, Tanzania, and related species from other Eastern Arc Mountains. With notes on *Eoseviulisoma* Brolemann, 1920, and *Suohelisoma* Hoffman, 1963 (Diplopoda, Polydesmida, Paradoxosomatidae). *European Journal of Taxonomy* 445: 1–90. <https://doi.org/10.5852/ejt.2018.445>

# Treatments: Data in disguise

Geographic coordinates

Date of collection

Collector

**Material** (total: 3 ♂♂)

## Holotype

TANZANIA: ♂, Mwanihana Forest, above Sanje, 1650 m a.s.l., pitfall trap, 18 Aug. 1982, M. Stoltze and N. Scharff leg. (ZMUC).

## Paratypes

TANZANIA: 1 ♂, Morogoro Region, Kilombero District, Udzungwa Mts National Park, forest below Mwanihana Peak, 7°49' S, 36°50' E, 1800 m a.s.l., sifted from leaf litter, 20 Aug. 2017, T. Pape leg. (ZMUC); 1 ♂, Morogoro Region, Udzungwa Mts National Park, Mito Mitatu, above Mang'ula, 07°49'3" S, 36°52'58" E, 1487 m a.s.l., 16 Dec. 2016,

Host collection



EUROPEAN JOURNAL OF TAXONOMY  
MATERIAL CITATIONS FORMATTING GUIDE

In accordance with the European Journal of Taxonomy's [FAIR & Open Science policy](#), the formatting guide for entomology, zoology and palaeozoology material citations is provided below (guidelines for botany available soon). Authors are encouraged to prepare their manuscripts according to this model prior to submission, but they will also be given the opportunity to comply upon acceptance of the article.

While EJT strongly recommends that authors adhere to the guidelines given below, the fine-grain formatting of the material citations is not compulsory: if an author decides not to comply or the material is not appropriate



# Locked up data

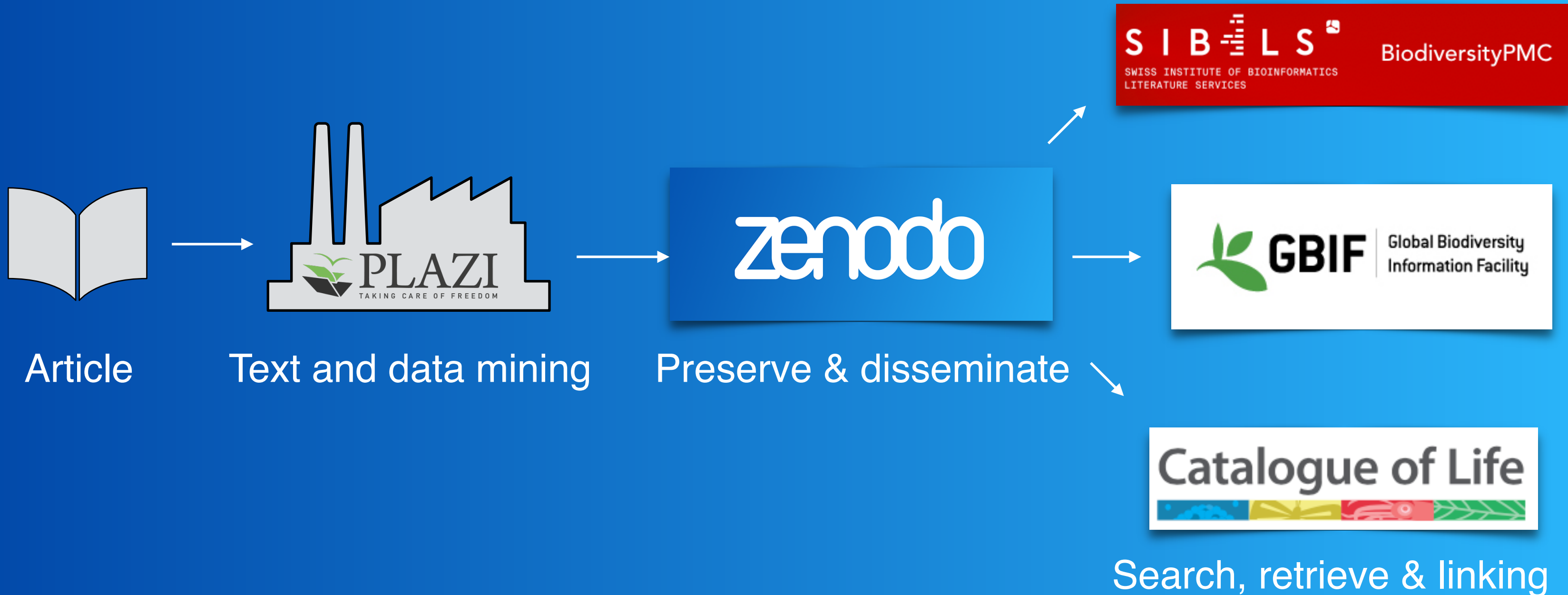
## Unanswerable questions:

- How many species have been described by my collection?
- Give me a list of all new species?
- Retrieve all images for a given taxon?
- What's known about a geographic region?

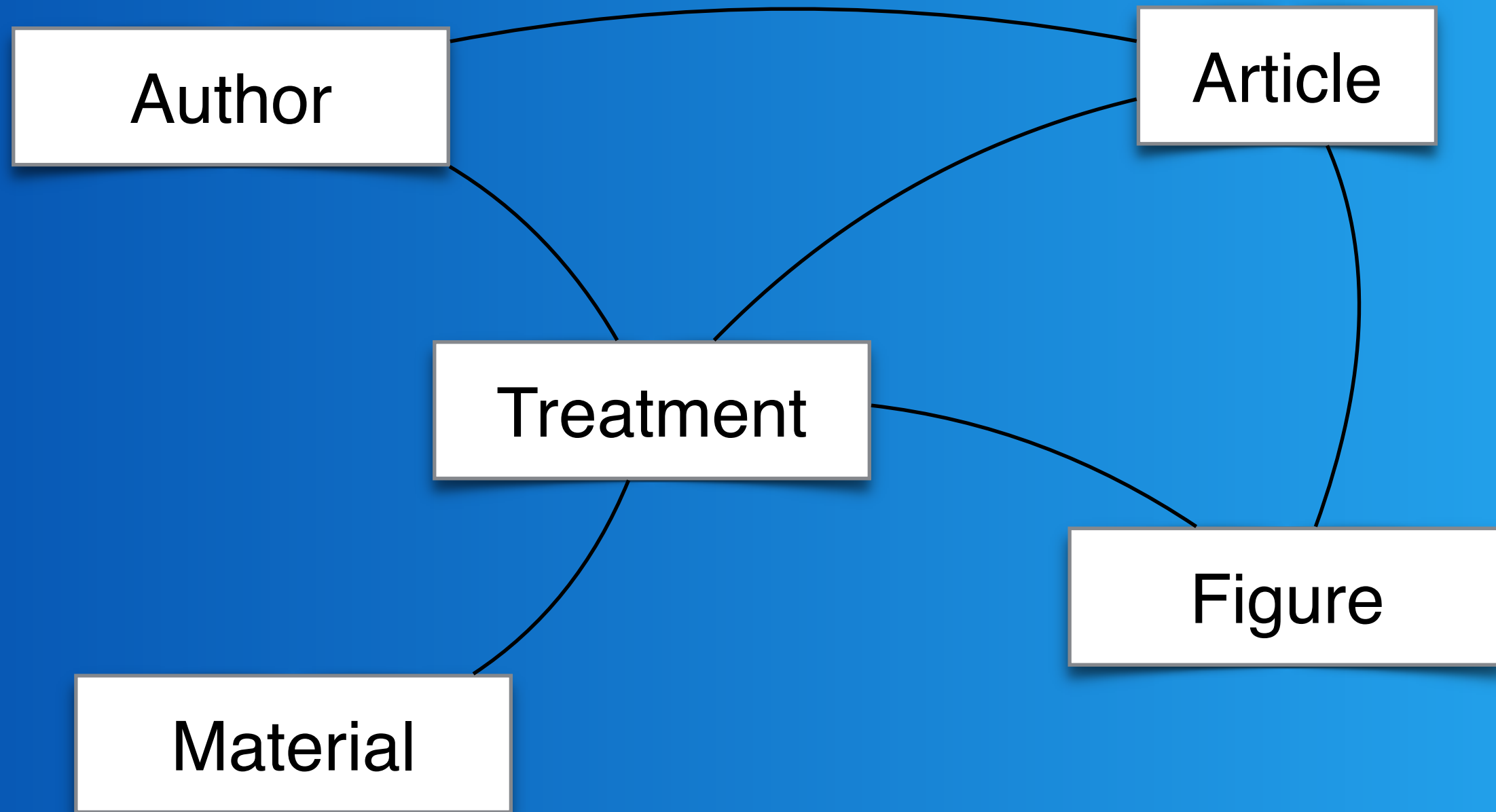
## • Treatments:

- Past 260 years: **~10+ millions** published
- Every year: **~17k** new / **~130k** augmented

# It takes an ecosystem



# It takes an ecosystem



# FAIR Data

zenodo Search records... Communities My dashboard Log in Sign up

Biodiversity Literature Repository

Published June 19, 2018 | Version v1 Figure Open

36 VIEWS 145 DOWNLOADS [Show more details](#)

Fig. 1 in A mountain of millipedes VII: The genus *Eviulisoma* Silvestri, 1910, in the Udzungwa Mountains, Tanzania, and related species from other Eastern Arc Mountains. With notes on *Eoseviulisoma* Brolemann, 1920, and *Suohelisoma* Hoffman, 1963 (Diplopoda, Polydesmida, Paradoxosomatidae)

Enghoff, Henrik

Fig. 1. *Eviulisoma zebra* sp. nov., one of the strikingly marked species from the Udzungwa Mts. Photograph by Martin Nielsen.

Notes

Published as part of Enghoff, Henrik, 2018, *A mountain of millipedes VII: The genus Eviulisoma Silvestri, 1910, in the Udzungwa Mountains, Tanzania, and related species from other Eastern Arc Mountains. With notes on Eoseviulisoma Brolemann, 1920, and Suohelisoma Hoffman, 1963 (Diplopoda, Polydesmida, Paradoxosomatidae), pp. 1-90 in European Journal of Taxonomy 445 on page 3, DOI: 10.5852/ejt.2018.445, http://zenodo.org/record/1489598*

Files

figure.png



External resources

Indexed in

OpenAIRE

Communities

Biodiversity Literature Repository

Keywords and subjects

Biodiversity Taxonomy Animalia Arthropoda Diplopoda Polydesmida Paradoxosomatidae Eviulisoma

Details

DOI 10.5281/zenodo.1489600

Get data How-to Tools Community About Login

TREATMENT ARTICLE | REGISTERED NOVEMBER 16, 2018

## A mountain of millipedes VII: The genus *Eviulisoma* Silvestri, 1910, in the Udzungwa Mountains, Tanzania, and related species from other Eastern Arc Mountains. With notes on *Eoseviulisoma* Brolemann, 1920, and *Suohelisoma* Hoffman, 1963 (Diplopoda, Polydesmida, Paradoxosomatidae)

Mediated by [Plazi.org taxonomic treatments database](#)

Enghoff H • plazi

DATASET TAXONOMY METRICS ACTIVITY DOWNLOAD HOME PAGE

82 MATERIALS EXAMINED 32 RECORDS 31 CITATIONS

This dataset contains the digitized treatments in Plazi based on the original journal article Enghoff, Henrik (2018): A mountain of millipedes VII: The genus *Eviulisoma* Silvestri, 1910, in the Udzungwa Mountains, Tanzania, and related species from other Eastern Arc Mountains. With notes on *Eoseviulisoma* Brolemann, 1920, and *Suohelisoma* Hoffman, 1963 (Diplopoda, Polydesmida, Paradoxosomatidae). *European Journal of Taxonomy* 445: 1-90, DOI: 10.5852/ejt.2018.445

Publication date: June 19, 2018  
 Metadata last modified: October 29, 2023  
 Hosted by: [Plazi.org taxonomic treatments database](#)  
 Licence: CC0 1.0  
 How to cite DOI 10.5852/ejt.2018.445

82 Occurrences	100% With taxon match	49% With coordinates	83% With year
32 Accepted names	0 Synonyms	100% Overlap with GBIF Backbone	100% Overlap with Catalogue of Life

40 GEOREFERENCED RECORDS



Why not use \_\_\_\_\_ instead?

# FAIR Principles

Findable, Accessible, Interoperable, Reusable


# FAIR Principles

- **Findable:** Persistent identifier (id); Metadata; Registered
- **Accessible:** Retrieval by id using standard free protocols (e.g. web); Metadata survive data.
- **Interoperable:** (meta)data uses broadly applicable knowledge representation
- **Reusable:** (meta)data are richly described; clear and accessible data usage license; provenance

# How?



# Digital Object Identifiers (DOI)

 Nuclear Instruments and Methods in Physics  
Research Section A: Accelerators,  
Spectrometers, Detectors and Associated  
Equipment

Volume 506, Issue 3, 1 July 2003, Pages 250-303

---

## GEANT4—a simulation toolkit

S. Agostinelli <sup>ae</sup>, J. Allison <sup>as</sup>, K. Amako <sup>e</sup>, J. Apostolakis <sup>a</sup>, H. Araujo <sup>aj</sup>, P. Arce <sup>lm x a</sup>,  
M. Asai <sup>g ai</sup>, D. Axen <sup>it</sup>, S. Banerjee <sup>bi l</sup>, G. Barrand <sup>an</sup>, F. Behner <sup>l</sup>, L. Bellagamba <sup>c</sup>,  
J. Boudreau <sup>bd</sup>, L. Broglio <sup>ar</sup>, A. Brunengo <sup>c</sup>, H. Burkhardt <sup>a</sup>, S. Chavie <sup>bj bl</sup>, J. Chuma <sup>h</sup>,  
R. Chytráček <sup>a</sup>, G. Cooperman <sup>az</sup>...D. Zschiesche <sup>af</sup>

Show more ▾

+ Add to Mendeley Share Cite

[https://doi.org/10.1016/S0168-9002\(03\)01368-8](https://doi.org/10.1016/S0168-9002(03)01368-8) Get rights and content ↗

---

### Abstract

GEANT4 is a toolkit for simulating the passage of particles through matter. It includes a complete range of functionality including tracking, geometry, physics models and hits. The physics processes offered cover a comprehensive range, including electromagnetic, hadronic and optical processes, a large set of long-lived particles, materials and elements, over a wide energy range starting, in some cases, from 250 eV and extending in others to the TeV energy range. It has been designed and constructed to expose the physics models utilised, to handle complex geometries, and to enable its easy adaptation for optimal use in different sets of applications. The toolkit is the result of a worldwide collaboration of physicists and software engineers. It has been created exploiting software

[https://doi.org/10.1016/S0168-9002\(03\)01368-8](https://doi.org/10.1016/S0168-9002(03)01368-8) (Hint: Use [unpaywall.org](https://unpaywall.org) to access)

## REFERENCES

1. W. D. Newhauser and R. Zhang, *Phys. Med. Biol.* **60**, R155 (2015).  
<https://doi.org/10.1088/0031-9155/60/8/r155>
2. M. Moteabbed, T. I. Yock, and H. Paganetti, *Phys. Med. Biol.* **59**, 2883 (2014).  
<https://doi.org/10.1088/0031-9155/59/12/2883>
3. T. Rodríguez-González, C. Guerrero, C. M. Bäcker, J. Bauer, C. Bäumer, S. Brons, W. Jentzen, M. C. Jiménez-Ramos, M. Á. Millán-Callado, C. Schömers, B. Timmermann, J. M. Quesada, and R. Capote, *Nucl. Data Sheets* **187**, 579 (2023).  
<https://doi.org/10.1016/j.nds.2023.01.004>
4. U. Oelfke, G. K. Y. Lam, and M. S. Atkins, *Phys. Med. Biol.* **41**, 177 (1996).  
<https://doi.org/10.1088/0031-9155/41/1/013>
5. K. Parodi, T. Bortfeld, and T. Haberer, *Int. J. Radiat. Oncol., Biol., Phys.* **71**, 945 (2008).  
<https://doi.org/10.1016/j.ijrobp.2008.02.033>
6. K. Parodi, A. Ferrari, F. Sommerer, and H. Paganetti, *Phys. Med. Biol.* **52**, 3369 (2007).  
<https://doi.org/10.1088/0031-9155/52/12/004>
7. A. C. Kraan, *Front. Oncol.* **5**, 150 (2015).  
<https://doi.org/10.3389/fonc.2015.00150>
8. C. Toramatsu, A. Mohammadi, H. Wakizaka, C. Seki, F. Nishikido, S. Sato, I. Kanno, M. Takahashi, K. Karasawa, Yo. Hirano, and T. Yamaya, *Phys. Med. Biol.* **65**, 105011 (2020).  
<https://doi.org/10.1088/1361-6560/ab8532>
9. C. Toramatsu, A. Mohammadi, H. Wakizaka, H. Sudo, N. Nitta, C. Seki, I. Kanno, M. Takahashi, K. Karasawa, Yo. Hirano, and T. Yamaya, *Phys. Med. Biol.* **67**, 125006 (2022).  
<https://doi.org/10.1088/1361-6560/ac72f3>
10. M. Faßbender, Yu. N. Shubin, and S. M. Qaim, *Radiochim. Acta* **84**, 59 (1999).  
<https://doi.org/10.1524/ract.1999.84.2.59>
11. A. L. Nichols and R. Capote, *Nucl. Data Sheets* **120**, 239 (2014).  
<https://doi.org/10.1016/j.nds.2014.07.056>
12. F. T. Tárkányi, A. V. Ignatyuk, A. Hermanne, R. Capote, B. V. Carlson, J. W. Engle, M. A. Kellett, T. Kibédi, G. N. Kim, F. G. Kondev, M. Hussain, O. Lebeda, A. Luca, Y. Nagai, H. Naik, A. L. Nichols, F. M. Nortier, S. V. Suryanarayana, S. Takács, and M. Verpelli, *J. Radioanalytical Nucl. Chem.* **319**, 533 (2019).  
<https://doi.org/10.1007/s10967-018-6380-5>
13. S. España, X. Zhu, J. Daartz, G. E. Fakhri, T. Bortfeld, and H. Paganetti, *Phys. Med. Biol.* **56**, 2687 (2011).  
<https://doi.org/10.1088/0031-9155/56/9/003>
14. D. Abriola and J. Tuli, in *Summary Report Technical Meeting on Nuclear Data for Medical Applications* (Office of Scientific and Technical Information (OSTI), Vienna, 2019).  
<https://doi.org/10.2172/1013442>
15. J. F. Briesmeister, MCNP-A General Monte Carlo N-Particle Transport Code, Report LA-12625-M (Los Alamos, N.M., 1993).
16. R. B. Firestone, *Table of Isotopes* (Hungary, 1997).
17. S. Agostinelli, J. Allison, K. Amako, J. Apostolakis, H. Araujo, P. Arce, M. Asai, D. Axen, S. Banerjee, G. Barrand, F. Behner, L. Bellagamba, J. Boudreau, L. Broglio, A. Brunengo, H. Burkhardt, et al., *Nucl. Instrum. Methods Phys. Res., Sect. A* **506**, 250 (2003).  
[https://doi.org/10.1016/S0168-9002\(03\)01368-8](https://doi.org/10.1016/S0168-9002(03)01368-8)
18. S. Corde, S. Hilaire, and A. J. Koning, *Phys. Rev. C* **78**, 64307 (2008).  
<https://doi.org/10.1103/physrevc.78.064307>
19. A. J. Koning and D. Rochman, *Nucl. Data Sheets* **113**, 2841 (2012).  
<https://doi.org/10.1016/j.nds.2012.11.002>
20. A. Gilbert and A. G. W. Cameron, *Can. J. Phys.* **43**, 1446 (1965).  
<https://doi.org/10.1139/p65-139>
21. G. Rudstam, *Nucl. Phys. A* **126**, 401 (1969).  
[https://doi.org/10.1016/0375-9474\(69\)90475-8](https://doi.org/10.1016/0375-9474(69)90475-8)
22. R. Silberberg and C. H. Tsao, *Astrophys. J., Suppl. Ser.* **25**, 315 (1973).  
<https://doi.org/10.1086/190271>

Translated by E. Oborin

**Publisher's Note.** Pleiades Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

# Digital Object Identifiers (DOI)

**INSPIRE HEP** literature   Help Submit Login

Literature Authors Jobs Seminars Conferences More...

## GEANT4--a simulation toolkit

GEANT4 Collaboration · S. Agostinelli (Genoa U.)

Aug, 2002

54 pages  
Published in: *Nucl.Instrum.Meth.A* 506 (2003) 250-303  
Published: 2003  
DOI: [10.1016/S0168-9002\(03\)01368-8](https://doi.org/10.1016/S0168-9002(03)01368-8)  
Report number: SLAC-PUB-9350, FERMILAB-PUB-03-339, CERN-IT-2002-003  
Experiments: [Geant4](#)  
View in: [CERN Document Server](#), [OSTI Information Bridge Server](#), [Nuclear Science References](#)

### Citations per year

Year	Citations
2001	0
2002	10
2003	20
2004	50
2005	100
2006	200
2007	300
2008	400
2009	500
2010	700
2011	1000
2012	1100
2013	1300
2014	1350
2015	1350
2016	1350
2017	1350
2018	1350
2019	1350
2020	1350
2021	1350
2022	1350
2023	1400
2024	700

Abstract: (Elsevier)  
Geant4 is a toolkit for simulating the passage of particles through matter. It includes a complete range of functionality including tracking, geometry, physics models and hits. The physics processes offered cover a comprehensive range, including electromagnetic, hadronic and optical processes, a large set of long-lived particles, materials and elements, over a wide energy range starting, in some cases, from Full-size image (<1 K) and extending in others to the TeV energy range. It has been designed and constructed to expose the physics models utilised, to handle complex geometries, and to enable its easy adaptation for optimal use in different sets of applications. The toolkit is the result of a worldwide collaboration of physicists and software engineers. It has been created exploiting software engineering and object-oriented technology and implemented in the C++ programming language. It has been used in applications in particle physics, nuclear physics, accelerator design, space engineering and medical physics.

Geant4: An object-oriented toolkit for simulation in HEP Geant4 Web page:  
[1] S. Giani  
• <http://cern.ch/geant4>

Feedback

# Digital Object Identifiers (DOI)

Resolvable

<http://doi.org/10.5281/zenodo.1100973>



<https://zenodo.org/record/1100973>

# Digital Object Identifiers (DOI)

Persistent

<http://doi.org/10.5281/zenodo.1100973>



<https://zenodo.org/record/1100973>

# Digital Object Identifiers (DOI)

Globally unique

<http://doi.org/10.5281/zenodo.1100973>

# Digital Object Identifiers (DOI)

## Metadata

```
<?xml version="1.0" encoding="utf-8"?>
<resource xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://datacite.org/schema/kernel-3" xsi:schemaLoc
  <identifier identifierType="DOI">10.5281/zenodo.1100973</identifier>
  <creators>
    <creator>
      <creatorName>Oramas, Sergio</creatorName>
      <nameIdentifier nameIdentifierScheme="ORCID" schemeURI="http://orcid.org/">0000-0002-8028-2890</nameIdentifier>
      <affiliation>Universitat Pompeu Fabra</affiliation>
    </creator>
  </creators>
  <titles>
    <title>Knowledge Extraction And Representation Learning For Music Recommendation And Classification</title>
  </titles>
  <publisher>Zenodo</publisher>
  <publicationYear>2017</publicationYear>
```

# Persistent identifiers

- **Digital Object Identifiers (DOIs):** Publications, data, software, presentations, posters, reports, ...
- **Open Researcher & Contributor ID (ORCID):** Researchers
- **Research Organization Registry (RORs):** Organisations, funders, ...

<https://doi.org/10.1371/journal.pone.0104798>

OPEN ACCESS Freely available online

PLOS ONE

## How Do Astronomers Share Data? Reliability and Persistence of Datasets Linked in AAS Publications and a Qualitative Study of Data Practices among US Astronomers

Alberto Pepe<sup>1,2\*</sup>, Alyssa Goodman<sup>1,2</sup>, August Muench<sup>1</sup>, Merce Crosas<sup>2</sup>, Christopher Erdmann<sup>1</sup>

<sup>1</sup>Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts, United States of America, <sup>2</sup>Institute for Quantitative Social Science, Harvard University, Cambridge, Massachusetts, United States of America

**Abstract**

We analyze data sharing practices of astronomers over the past fifteen years. An analysis of URL links embedded in papers published by the American Astronomical Society reveals that the total number of links included in the literature rose dramatically from 1997 until 2005, when it leveled off at around 1500 per year. The analysis also shows that the availability of linked material decays with time: in 2011, 44% of links published a decade earlier, in 2001, were broken. A rough analysis of link types reveals that links to data hosted on astronomers' personal websites become unreachable much faster than links to datasets on curated institutional sites. To gauge astronomers' current data sharing practices and preferences further, we performed in-depth interviews with 12 scientists and online surveys with 173 scientists, all at a large astrophysical research institute in the United States: the Harvard-Smithsonian Center for Astrophysics, in Cambridge, MA. Both the in-depth interviews and the online survey indicate that, in principle, there is no philosophical objection to data-sharing among astronomers at this institution. Key reasons that more data are not presently shared more efficiently in astronomy include: the difficulty of sharing large data sets; over reliance on non-robust, non-reproducible mechanisms for sharing data (e.g. emailing it); unfamiliarity with options that make data-sharing easier (faster) and/or more robust; and, lastly, a sense that other researchers would not want the data to be shared. We conclude with a short discussion of a new effort to implement an easy-to-use, robust, system for data sharing in astronomy, at [theastrodata.org](http://theastrodata.org), and we analyze the uptake of that system to-date.

**Citation:** Pepe A, Goodman A, Muench A, Crosas M, Erdmann C (2014) How Do Astronomers Share Data? Reliability and Persistence of Datasets Linked in AAS Publications and a Qualitative Study of Data Practices among US Astronomers. PLOS ONE 9(8): e104798. doi:10.1371/journal.pone.0104798

**Editor:** Aaron Alain-Jon Golden, Albert Einstein College of Medicine, United States of America

**Received:** November 20, 2013; **Accepted:** July 18, 2014; **Published:** August 28, 2014

**Copyright:** © 2014 Pepe et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Funding:** This material is based upon work supported by the National Aeronautics and Space Administration under Grant/Contract/Agreement No. NNA12AE11G issued through the Astrophysical Data Analysis Program (ADAP). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Competing Interests:** The authors have declared that no competing interests exist.

\* Email: [alberto.pepe@gmail.com](mailto:alberto.pepe@gmail.com)

### Introduction

No, I don't have a website where I store these data. Most of it is in various stages of mess. —An Astronomer

Astronomical observations can generate very large volumes of data, and observations taken at a particular time are by definition irreplaceable and unrepeatable. As such, making astronomical data publicly available in a structured, intelligible format is of fundamental importance to enable scientific transparency and long term data curation and preservation, facilitating data re-use [1].

To date, some of the most systematically planned data sharing in astronomical research has focused on the preservation and dissemination of observations created in so-called "sky surveys." The purpose of these surveys is to collect and measure data from extended regions of the Sky, in a systematic and controlled fashion. Modern optical sky surveys, such as the Sloan Digital Sky Survey (SDSS), the 2-Micron All-Sky Survey (2MASS), and the future

Large Synoptic Survey Telescope (LSST) generate massive databases, ranging in size from hundreds of terabytes to hundreds of petabytes [2]. Surveys that rely on spectrally-resolved observations, often made with radio-wavelength interferometers, generate "3D Data Cubes" rather than "2D images," and they are already so large that it is not possible to keep all the raw data after analysis is complete.

Despite their sheer volume, the data collected in the context of large surveys represent only a portion of all the data generated in Astronomy. Most discoveries rely upon smaller studies, and/or are based on heavily-processed subsets of many surveys. In any field of scientific endeavor, many different levels of data exist [3]: from "raw" data to "processed" data, from "calibration" data to "published" data. If we imagine all data in Astronomy to be a pyramid, **primary** data from large sky surveys occupies the bottom half of the pyramid. But, as we just mentioned, these primary data are used by astronomers all over the world to produce more specific studies, where astronomers analyze and process primary data in many ways producing **derived** data.

PLOS ONE | [www.plosone.org](http://www.plosone.org) August 2014 | Volume 9 | Issue 8 | e104798

Half the links in papers are inaccessible after 10 years!

# ORCID - Your science passport

The screenshot shows the ORCID website header with the logo and tagline "Connecting research and researchers". Navigation links for "Sign in / Register" and "English" are present. A search bar is located in the top right. The main profile area features the name "Nielsen, L. H." and "Lars Holm Nielsen". Below this is the ORCID iD "https://orcid.org/0000-0001-8135-3489" with copy and print icons, and a link to "Show record summary". The profile is divided into two columns: "Personal information" and "Activities". Under "Personal information", there are sections for "Emails" (listing "lars.holm.nielsen@cern.ch") and "Other IDs" (listing "GitHub: lnielsen"). The "Activities" section is titled "Employment (2)" and lists two roles: "Software Engineer (IT)" at the "European Organization for Nuclear Research: Genève, GE, CH" and "Advanced Projects Coordinator (Education & Public Outreach Department)" at the "European Southern Observatory: Garching, Bayern, DE". Both activities include dates, job titles, and a "Show more detail" link. The source for both is listed as "ZENODO".

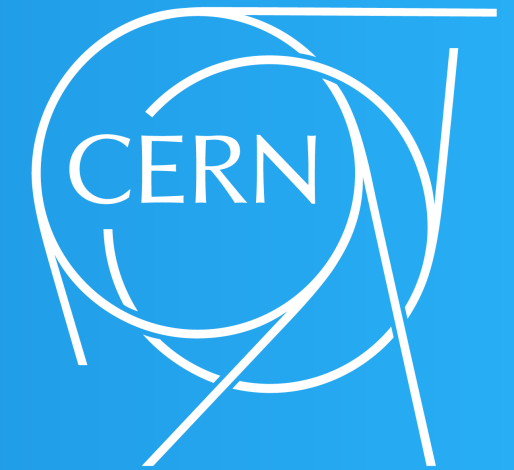
The screenshot shows the "Create your ORCID iD" registration page, specifically "Step 1 of 5 - Names and emails". It includes the ORCID logo and a heading "Create your ORCID iD". Below the heading is a sub-heading "Step 1 of 5 - Names and emails". A paragraph explains that users can only register for an ORCID iD for themselves and provides a link to "Sign In" if they already have one. The registration form is divided into three sections: "Your names", "Your email addresses", and "Additional email (Optional)". The "Your names" section has a "Given names" field with the placeholder "The names you most commonly go by" and a "Family names (Optional)" field with the placeholder "Your family name or surname". The "Your email addresses" section has a "Primary email" field with the placeholder "The email address you use most" and a "Confirm primary email" field. The "Additional email (Optional)" section has a field with the placeholder "Add an additional email". At the bottom of the form is a large "Next Step" button.

<https://orcid.org/register>



# Data publishing 101

# zenodo.org



## Upload

## Describe

## Publish

The screenshot shows the Zenodo website interface. At the top, there is a navigation bar with the Zenodo logo, a search bar labeled "Search records...", and links for "Communities" and "My dashboard". A user profile dropdown menu is visible on the right, showing "lars.holm...".

The main content area features a "Recent uploads" section. The first upload is titled "An integrated population model reveals source-sink dynamics for competitively subordinate African wild dogs linked to anthropogenic prey depletion". It is dated "January 17, 2024 (v1)", is a "Dataset", and is "Open". The authors listed are "Creel, Scott"; "Merkle, Johnathan"; and "Goodheart, Ben". A short abstract follows: "Many African large carnivore populations are declining due to decline of the herbivore populations on which they depend. The densities of apex carnivores like the lion and spotted hyena correlate strongly with prey density, but competitive subordinates like the African wild dog benefit from competitive release when the density of apex...". Below the abstract, it says "Uploaded on January 17, 2024" and shows "0" views and "0" downloads.

On the right side, there is a sidebar titled "Why use Zenodo?" with the following bullet points:

- **Safe** — your research is stored safely for the future in CERN's Data Centre for as long as CERN exists.
- **Trusted** — built and operated by CERN and OpenAIRE to ensure that everyone can join in Open Science.
- **Citeable** — every upload is assigned a Digital Object Identifier (DOI), to make them citable and trackable.
- **No waiting time** — Uploads are made available online as soon as you hit publish, and your DOI is registered within seconds.
- **Open or closed** — Share e.g. anonymized

# Upload

Files ▼

Metadata-only record ?

Storage available 0 out of 100 files 0 bytes out of 50.00 GB

Drag and drop files - or - Upload files

Publications

Presentations

Image

Videos

Posters

Software

Data

# Describe

Basic information ▼

**Digital Object Identifier \***  
Do you already have a DOI for this upload?  Yes  No

A DOI allows your upload to be easily and unambiguously cited. Example: 10.1234/foo.bar

**Resource type \***

**Title \***

**Publication date \***

In case your upload was already published elsewhere, please use the date of the first publication. Format: YYYY-MM-DD, YYYY-MM, or YYYY. For intervals use DATE/DATE, e.g. 1939/1945.


**Creators \***

Draft ⓘ

**Visibility \***

Files only

Public  Restricted

 **Public**  
The record and files are publicly accessible.

Options

**Apply an embargo** ⌚  
Record or files protection must be restricted to apply an embargo.

# Publish

zenodo

Search records...



Communities

My dashboard

Log in

Sign up



Knowledge Junction

Published January 17, 2024 | Version v6

Software

Open

## Bayesian Benchmark Dose Modelling WEB app

Kremer, Cécile<sup>1</sup>; Oluwafemi, Olusoji<sup>1</sup>; Shkedy, Ziv<sup>1</sup>; Aerts, Marc<sup>1</sup>; Verlinden, Wouter<sup>2</sup>; Varewyck, Machteld<sup>2</sup>; Verbeke, Tobias<sup>2</sup>; Neri, Franco Maria<sup>3</sup>; Cortiñas Abrahantes, José<sup>3</sup>

Show affiliations

This online application implements statistical methods for Bayesian Benchmark dose modelling using the BMABMDR R-package, available on [GitHub](#). Both continuous and quantal data can be used for estimating the benchmark dose of interest (BMD). Bayesian model averaging is performed on the fitted models with the possibility to include informative priors (and other options). Among the reported outputs are the upper and lower bounds of the BMD, weights of the fitted models and plots visualizing the fit and weights of each model.

### Notes

The tool is implemented in R. EU, en, .tar.gz, wouter.verlinden@openanalytics.eu

### Files

Files (379.5 MB)

Name

Size

Download all

BMABMDR\_0.0.0.9075.tar.gz

md5:61c422ca067601f23299a3ce738867c4

374.4 MB

Download

bmaBmdrUI\_0.1.0.tar.gz

md5:06d8cea580a1d4f728e2160d067227c2

5.1 MB

Download

### Additional details

835  
VIEWS



154  
DOWNLOADS



Show more details

### Versions

Version v6

Jan 17, 2024

10.5281/zenodo.10523648

Version v5

Dec 6, 2023

10.5281/zenodo.10275881

Version v4

Nov 16, 2022

10.5281/zenodo.7986184

Version v3

Nov 16, 2022

10.5281/zenodo.7759037

Version v2

Nov 16, 2022

10.5281/zenodo.764

DOI 10.5281/zenodo.10523648

**Cite all versions?** You can cite all versions by using the DOI 10.5281/zenodo.7334434. This DOI represents all versions, and will always resolve to the latest one. [Read more.](#)

### External resources

Indexed in

zenodo



# Self-organise: Communities

## Setup your new community

**Community name \***

**Identifier \***

This is your community's unique identifier. You will be able to access your community through the URL: <https://zenodo.org/communities/>

### Community visibility

**Public**  
Your community is publicly accessible and shows up in search results.

**Restricted**  
Your community is restricted to users with access.

The screenshot shows the Zenodo website interface. At the top, there is a search bar and navigation links for 'Communities' and 'My dashboard'. The main header features the Zenodo logo and a search bar. Below the header, the community page for 'Danish National Sandbox for Health Data Science' is displayed. The page includes a profile picture, a URL, and a list of member organizations. A 'New upload' button is visible in the top right corner. The main content area shows a list of records with filters for 'Versions', 'Access status', 'Resource types', and 'Subjects'. The first record is 'hds-sandbox/RDM\_NGS\_course: Version 1.1 of the RDM for NGS data workshop' by Jose Alejandro Romero Herrera, uploaded on November 30, 2023. The second record is 'Introduction to bulk RNAseq analysis: supplementary material' by Jose Alejandro Romero Herrera, uploaded on November 29, 2023. The third record is 'hds-sandbox/bulk\_RNAseq\_course: KU Workshop 2024. First Vampirium release' by Jose Alejandro Romero Herrera, Henrike Zschach, and Adrija Kalvisa, uploaded on November 28, 2023.

zenodo Search records... Communities My dashboard Log in Sign up

Danish National Sandbox for Health Data Science  
<https://hds-sandbox.github.io/> Organization Center for Health Data Science, University of Copenhagen, University of Copenhagen ROR, University of Southern Denmark ROR, Aalborg University ROR, Aarhus University ROR, Technical University of Denmark ROR

New upload

Records Members Curation policy About

4 results found Sort by Newest

**Versions**  
 View all versions

**Access status**  
 Open

**Resource types**  
 Software  
 Dataset  
 Lesson

**Subjects**  
 RNAseq  
 bioinformatics  
 course

November 30, 2023 (v1.1) Software Open  
**hds-sandbox/RDM\_NGS\_course: Version 1.1 of the RDM for NGS data workshop.**  
Jose Alejandro Romero Herrera  
This is the release v1.1 of the self-learning materials for the Research Data Management (RDM) workshop for Next Generation Sequencing (NGS) data. The course is provided by the danish National Health Data Science (HDS) Sandbox project, hosted by the Center for Health Data Science at the University of Copenhagen. This course is a short tutorial ...  
4 Uploaded on November 30, 2023  
1 more versions exist for this record 63 0

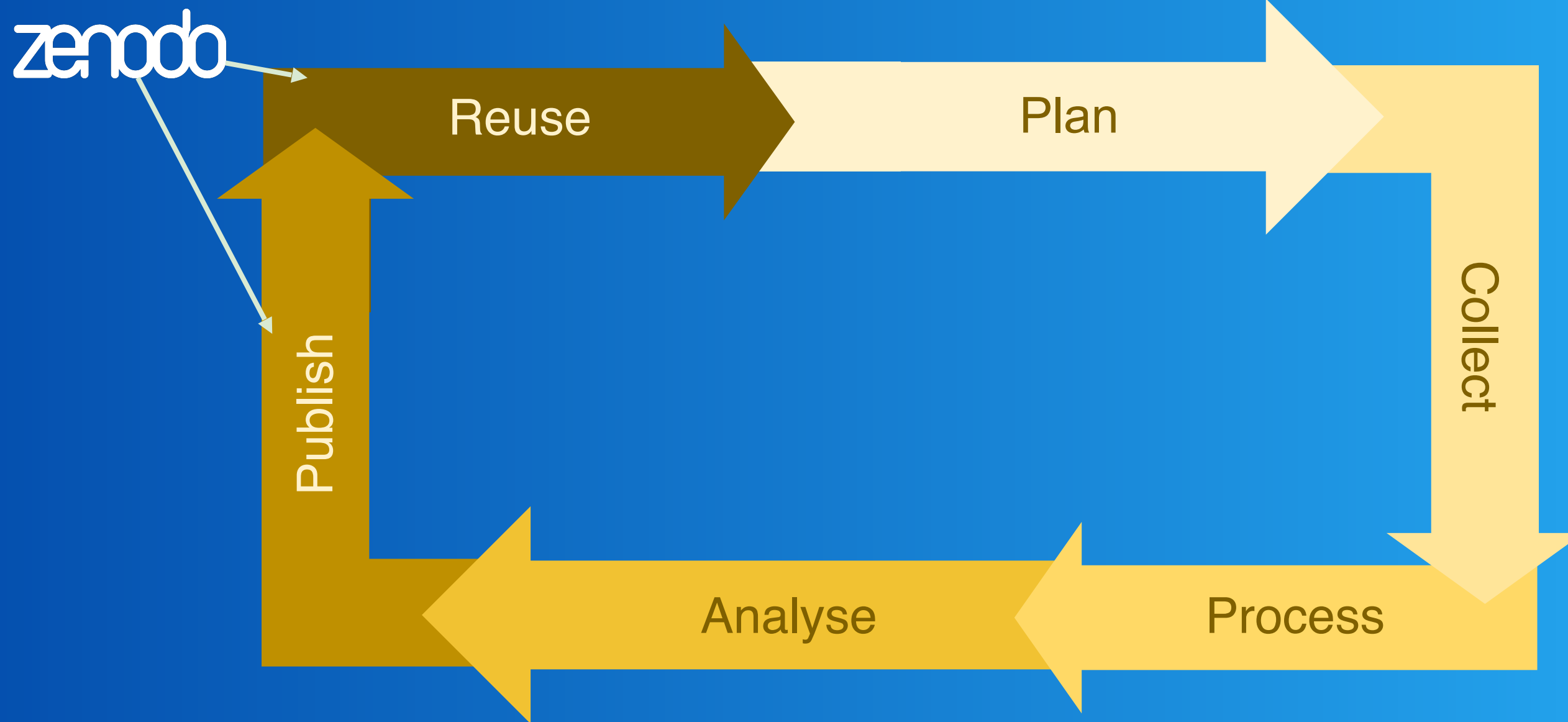
November 29, 2023 (Vampirium\_v1.0) Dataset Open  
**Introduction to bulk RNAseq analysis: supplementary material**  
Jose Alejandro Romero Herrera  
Vampirium setup This archive contains materials (datasets, exercises and slides, etc) used for the Introduction to bulk RNAseq analysis workshop taught at the University of Copenhagen by the Center for Health Data Science (HeaDS). The course repo can be found on Github: Assignments.zip contains exercises for the preprocessing part of the course, ...  
1 Uploaded on November 29, 2023  
8 more versions exist for this record 764 353

November 28, 2023 (v4.0.1) Software Open  
**hds-sandbox/bulk\_RNAseq\_course: KU Workshop 2024. First Vampirium release**  
Jose Alejandro Romero Herrera; Henrike Zschach; Adrija Kalvisa

# Before you share...

- **File formats:** Use open/scientific formats
  - CSV, Plain text, PDF, Root, ...
  - Can you open it in 5, 10, 50 years?
- **Software:** Prefer open source over closed source (i.e. has an open source license like MIT or GPL)
- **License:**
  - [choosealicense.com](http://choosealicense.com)
  - Did you respect copyright/licenses of others?

# Start early





# Key points

- Retain your copyright + license your work
- Be very careful of publishing scams!
- Start early!
- Open science is ‘just’ science

# Backup slides

# Exercise (sandbox)

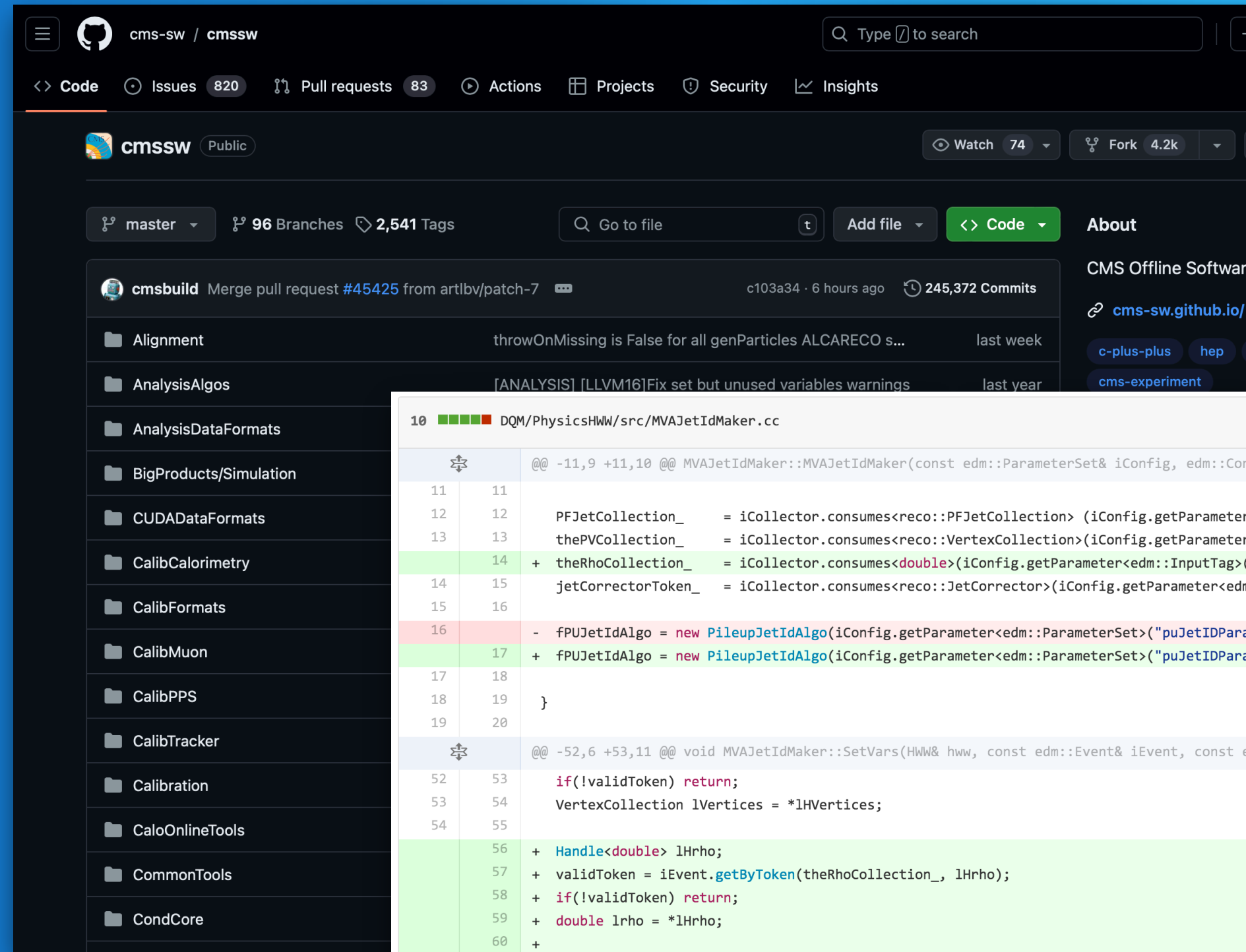
- **Step 1:** Create an ORCID (if you don't have one):
  - <https://sandbox.orcid.org/register>
- **Step 2:** Create a Zenodo account
  - <https://sandbox.zenodo.org/signup/>
- **Step 3:** Share and preserve your thesis
  - <https://help.zenodo.org/docs/deposit/create-new-upload/>

# Learn open tools

- <https://software-carpentry.org>
- <https://datacarpentry.org>

# File versioning: Use git

- Paper\_v1.doc
- Paper\_v2.doc
- Paper\_v3\_final.doc
- Paper\_v3\_final\_lhn.doc
- Paper\_v3\_final\_tjs.doc



The screenshot shows the GitHub interface for the cms-sw/cmssw repository. At the top, there are navigation tabs for Code, Issues (820), Pull requests (83), Actions, Projects, Security, and Insights. The repository name is cms-sw / cmssw, and it is public. Below the repository name, there are statistics: 96 Branches, 2,541 Tags, 74 Watchers, and 4.2k Forks. A merge pull request #45425 from artlbv/patch-7 is highlighted, with a commit hash c103a34 and 245,372 Commits. The left sidebar shows a file tree with folders like Alignment, AnalysisAlgos, AnalysisDataFormats, BigProducts/Simulation, CUDADDataFormats, CalibCalorimetry, CalibFormats, CalibMuon, CalibPPS, CalibTracker, Calibration, CaloOnlineTools, CommonTools, and CondCore. The main content area shows a diff for the file DQM/PhysicsHWW/src/MVAJetIdMaker.cc. The diff highlights changes in the MVAJetIdMaker constructor and the SetVars method. The constructor changes include adding theRhoCollection\_ and jetCorrectorToken\_ to the list of consumed collections. The SetVars method changes include adding a Handle<double> lHrho parameter and a validToken variable, and updating the logic for handling theRhoCollection\_ and lHrho.

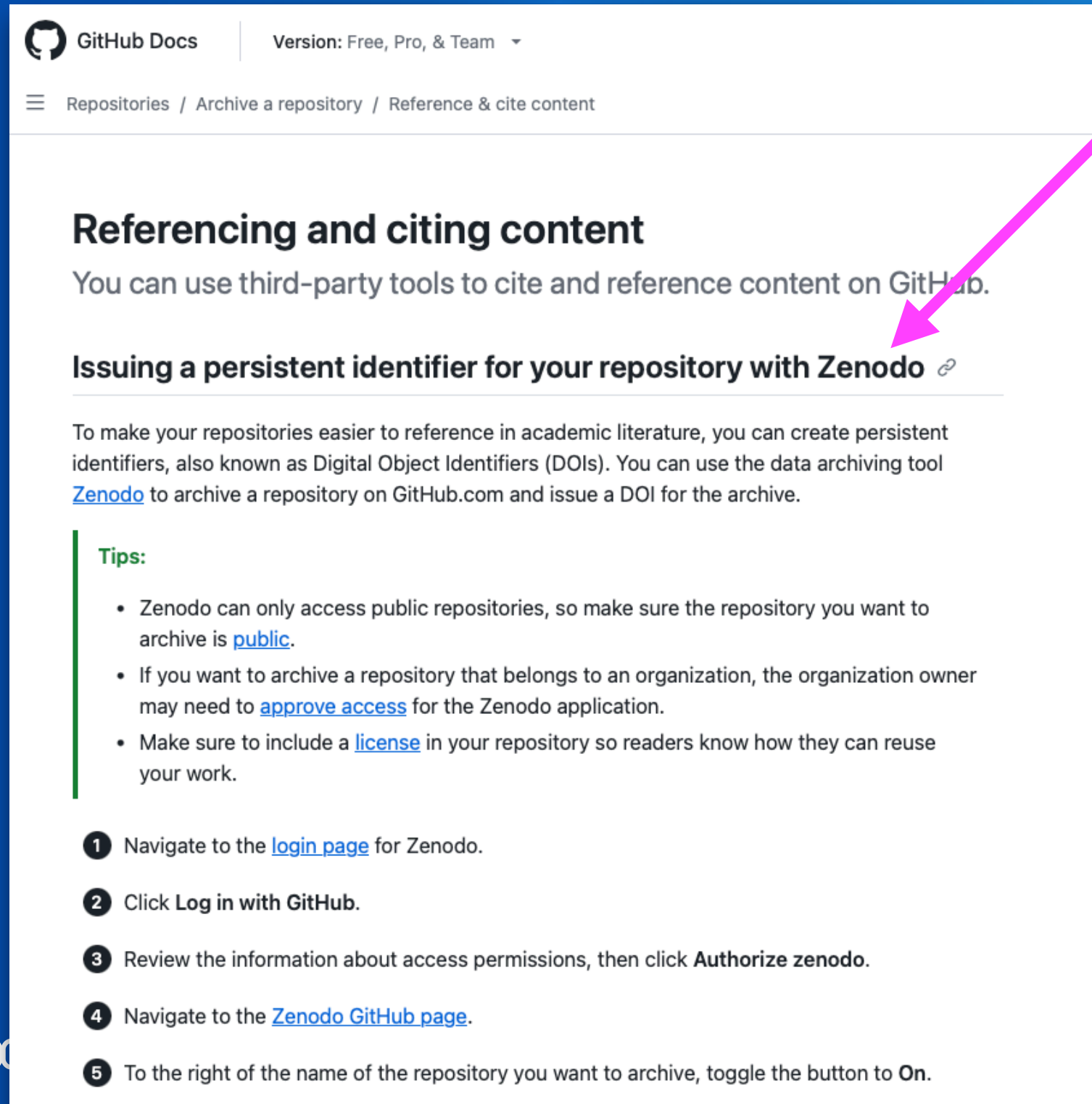
# Research software



The screenshot shows the GitHub repository page for `scikit-hep/uproot3`. At the top, a yellow banner states: "This repository has been archived by the owner on Jun 21, 2022. It is now read-only." The repository is a public archive with 23 watches, 67 forks, and 315 stars. The current version is 3.14.4, with 11 branches and 209 tags. A commit by `jpivarski` from 4 years ago is highlighted, with the message "The next version number will be 3.14.4." and 2,179 commits. The file list includes `dev`, `docs`, `tests`, `uproot3`, `.gitignore`, `LICENSE`, `README.rst`, `requirements.txt`, and `setup.py`. The right sidebar shows the repository's description: "ROOT I/O in pure Python and NumPy." and lists various tags like `python`, `big-data`, `analysis`, `numpy`, `bigdata`, `python3`, `file-format`, `root`, `hep`, `root-cern`, `hep-ex`, and `scikit-hep`. It also displays the license (BSD-3-Clause), activity, and 204 releases.

The screenshot shows the Zenodo record page for `scikit-hep/uproot3: 3.14.4`. The page is published on February 12, 2021, and is version 3.14.4. It has 3K views and 3K downloads. The record is categorized as software and is open. The authors listed are Jim Pivarski, Pratyush Das, Chris Burr, Dmitri Smirnov, Matthew Feickert, Tamas Gal, Luke Kreczko, Nicholas Smith, Noah Biederbeck, Oksana Shadura, Mason Proffitt, benkrikler, Hans Dembinski, Henry Schreiner, Jonas Rembser, Marcel R., Chao Gu, Edoardo, Eduardo Rodrigues, JMSchoeffmann, Jonas Rübenach, Lukas Koch, Michele Peresano, Niclas Eich, and Ruggero Turra. A commit message is shown: "@NiclasEich fixed a significant performance bug in jagged array writing. I cleaned up many of the NumPy 1.20 warnings." The files section shows a list of files and folders, including `scikit-hep/uproot3-3.14.4.zip` (163.9 kB), `scikit-hep-uproot3-54f5151` (a folder), `.gitignore` (1.2 kB), `LICENSE` (1.5 kB), `README.rst` (163.9 kB), `dev` (a folder), `allstreamers.c` (3.2 kB), `streamergen.py` (1.4 kB), `streamerversions.json` (1.2 kB), and `docs` (a folder). The right sidebar shows the versions list, including Version 3.14.4 (Feb 12, 2021), Version 3.14.3 (Feb 8, 2021), Version 3.14.2 (Dec 14, 2020), Version 3.14.1 (Nov 30, 2020), and Version 3.13.1 (Nov 24, 2020). It also includes a "Cite all versions?" section and external resources.

# Research software



GitHub Docs | Version: Free, Pro, & Team

Repositories / Archive a repository / Reference & cite content

## Referencing and citing content

You can use third-party tools to cite and reference content on GitHub.

### Issuing a persistent identifier for your repository with Zenodo [↗](#)

To make your repositories easier to reference in academic literature, you can create persistent identifiers, also known as Digital Object Identifiers (DOIs). You can use the data archiving tool [Zenodo](#) to archive a repository on GitHub.com and issue a DOI for the archive.

**Tips:**

- Zenodo can only access public repositories, so make sure the repository you want to archive is [public](#).
- If you want to archive a repository that belongs to an organization, the organization owner may need to [approve access](#) for the Zenodo application.
- Make sure to include a [license](#) in your repository so readers know how they can reuse your work.

- 1 Navigate to the [login page](#) for Zenodo.
- 2 Click **Log in with GitHub**.
- 3 Review the information about access permissions, then click **Authorize zenodo**.
- 4 Navigate to the [Zenodo GitHub page](#).
- 5 To the right of the name of the repository you want to archive, toggle the button to **On**.

85% of all software DOIs are in Zenodo

# GitHub

## Danger Zone

### Make this repository private

Public forks can't be made private. Please [duplicate the repository](#) or [contact support](#).

Make private

### Transfer Ownership

Transfer this repo to another user or to an organization where you have admin rights.

Transfer

### Delete this repository

Once you delete a repository, there is no going back. Please be certain.

Delete this repository

Once you delete a repository, there is no going back. Please be certain.

Delete this repository

Delete this repository













# Software citation

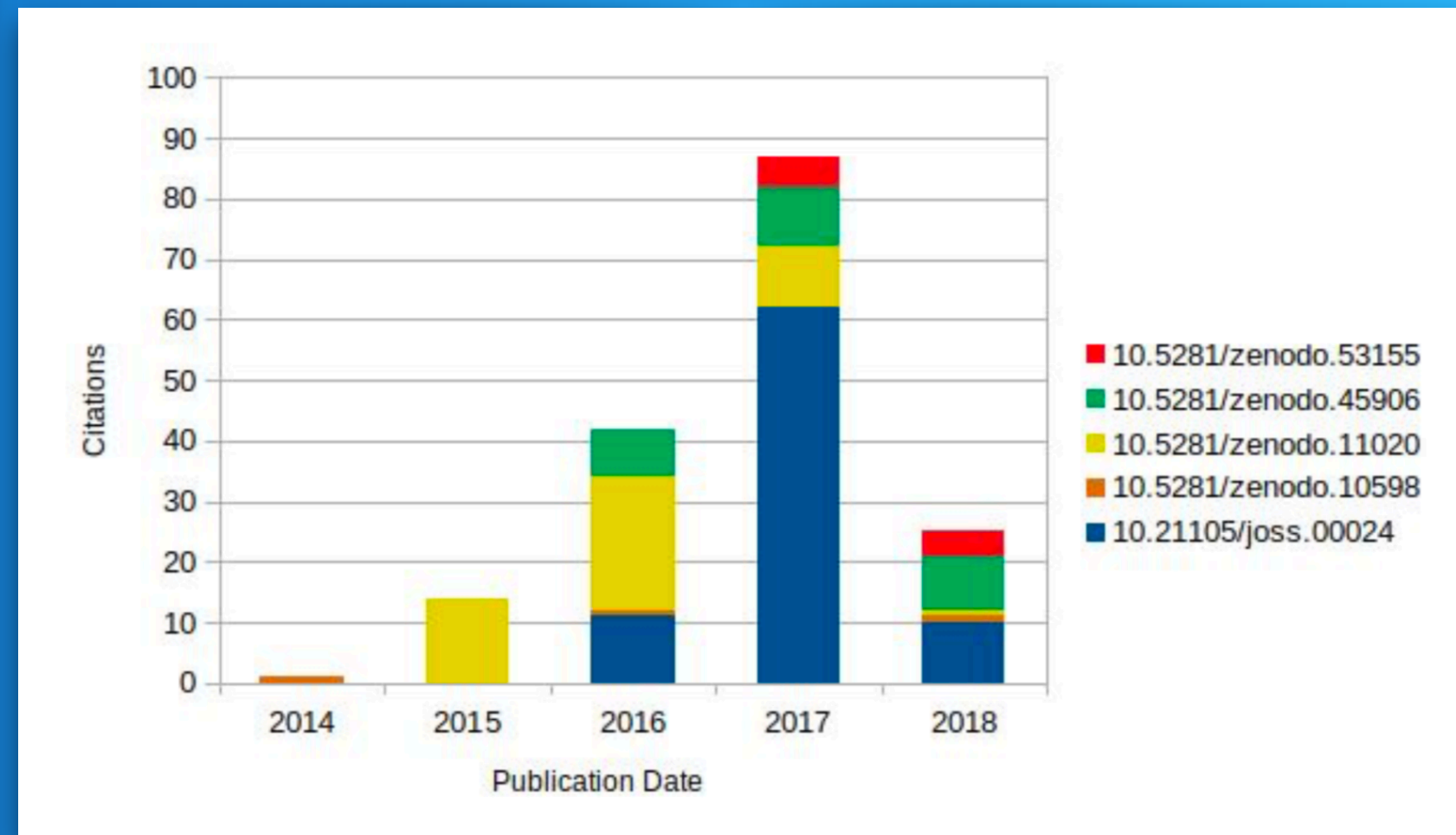
Citations ? **15**

**Show only:**  Literature (15)  Dataset (0)  Software (0)  
 Unknown (0)  Citations To This Version

Search for citation ... Search

 <a href="#">MadMiner: Machine learning-based inference for particle physics</a> Brehmer, Johann et al.	2019	<a href="#">ADS</a> <a href="#">ARXIV</a>	<a href="#">?</a>
 <a href="#">Benchmarking simplified template cross sections in \$WH\$ production</a> Brehmer, Johann et al.	2019	<a href="#">ADS</a> <a href="#">ARXIV</a>	<a href="#">?</a>
 <a href="#">AlphaTwirl. A Python library for summarizing event data into multivariate cat...</a> Sakuma, Tai (DOI: 10.1051/epjconf/201921402001)	2019	<a href="#">ADS</a> <a href="#">ARXIV</a> <a href="#">DOI</a>	<a href="#">?</a>
 <a href="#">The Scikit-HEP Project</a> Rodrigues, Eduardo (DOI: 10.1051/epjconf/201921406005)	2019	<a href="#">ADS</a> <a href="#">ARXIV</a> <a href="#">DOI</a>	<a href="#">?</a>
 <a href="#">A response-matrix-centred approach to presenting cross-section measurements</a> Koch, L. (DOI: 10.1088/1748-0221/14/09/P09013)	2019	<a href="#">ADS</a> <a href="#">ARXIV</a> <a href="#">DOI</a>	<a href="#">?</a>
 <a href="#">Recent developments in histogram libraries</a> Dembinski, Hans Peter et al. (DOI: 10.1051/epjconf/202024505014)	2020	<a href="#">ADS</a> <a href="#">DOI</a>	<a href="#">?</a>
 <a href="#">The Scikit HEP Project overview and prospects</a> Rodrigues, Eduardo et al. (DOI: 10.1051/epjconf/202024506028)	2020	<a href="#">ARXIV</a> <a href="#">ADS</a> <a href="#">DOI</a>	<a href="#">?</a>
 <a href="#">Real-time HEP analysis with funcX, a high-performance platform for function a...</a> Woodard, Anna Elizabeth et al. (DOI: 10.1051/epjconf/202024507046)	2020	<a href="#">DOI</a> <a href="#">ADS</a>	<a href="#">?</a>
 <a href="#">A FAIR and AI-ready Higgs Boson Decay Dataset</a> Chen, Yifan et al.	2021	<a href="#">ADS</a> <a href="#">ARXIV</a>	<a href="#">?</a>
 <a href="#">Calorimetric Measurement of Multi-TeV Muons via Deep Regression</a> Kieseler, Jan et al.	2021	<a href="#">ADS</a> <a href="#">ARXIV</a>	<a href="#">?</a>

Page size: 10



# Domain-specific metadata

## Searchable metadata

The screenshot shows a metadata editor interface with several fields on the left and a taxonomic tree on the right. The fields include:

- Basis of record:** The specific nature of the data record, e.g., PreservedSpecimens. Biodiversity: dwc. Multiple value field.
- Catalog number:** An identifier for the record within the catalog or collection. Biodiversity: dwc.
- Class:** The taxonomic class of the organism. Biodiversity: dwc.
- Collection code:** A unique identifier assigned to the collection from which the specimen was collected. Biodiversity: dwc.
- Country:** The name of the country or major administrative unit where the specimen was collected. Biodiversity: dwc.
- County:** The name of the county, shire, or equivalent where the specimen was collected. Biodiversity: dwc.
- Date identified:** The date when the specimen was identified or determined. Biodiversity: dwc.

The taxonomic tree on the right shows the following hierarchy:

- Biodiversity**
- Family** [Paradoxosomatidae](#)
- Genus** [Eviulisoma](#)
- Kingdom** [Animalia](#)
- Order** [Polydesmida](#)
- Phylum** [Arthropoda](#)
- Scientific name authorship** [Silvestri](#)
- Taxon rank** [genus](#)
- Taxonomic concept label** [Eviulisoma Silvestri, 1910 sec. Enghoff, 2018](#)

## Vocabularies

The screenshot shows a 'Keywords and subjects' interface. The 'Suggest from' dropdown is set to 'EuroSciVoc'. The search input contains 'phys'. The search results are:

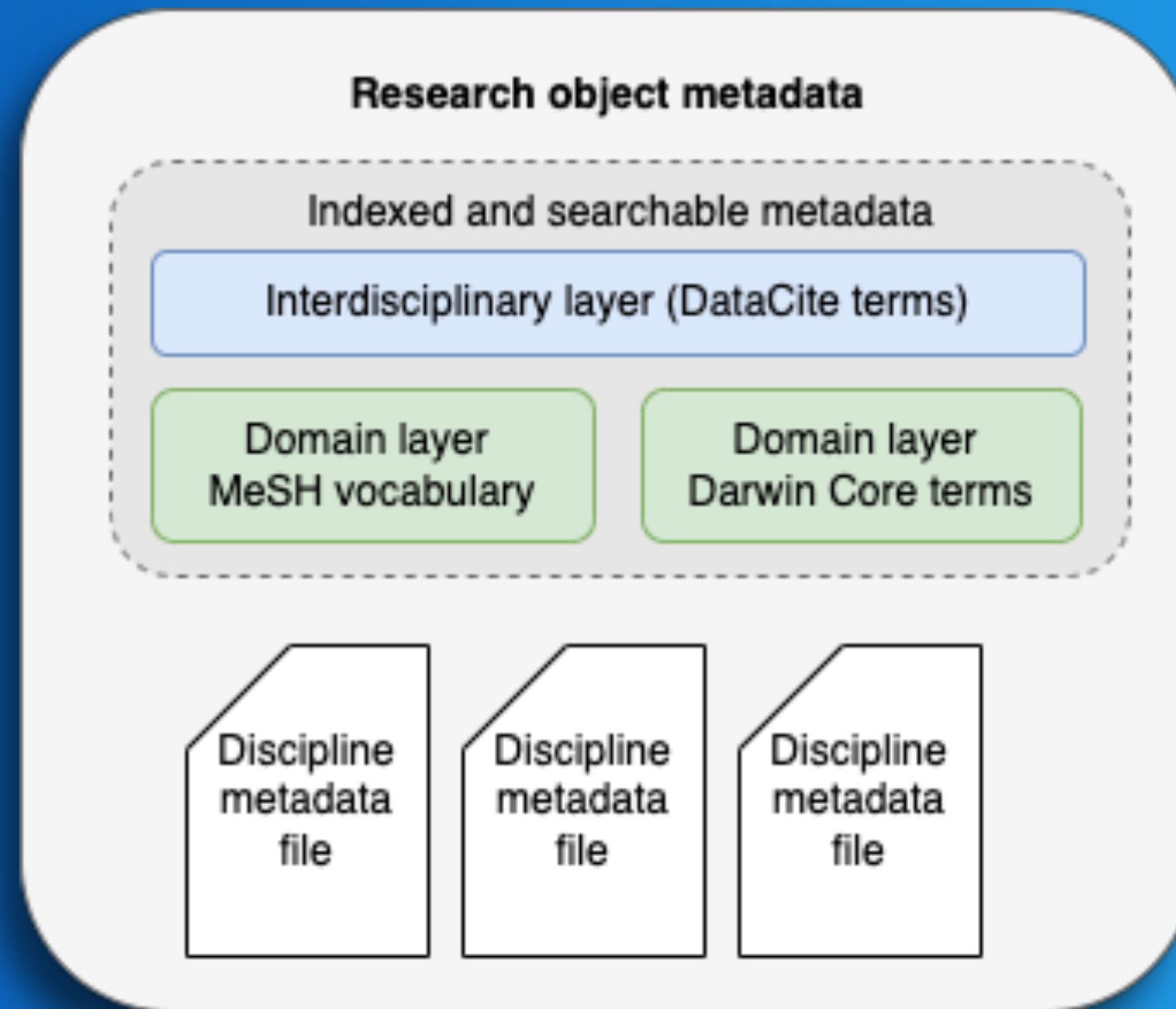
- Add phys
- (EuroSciVoc) Solar physics
- (EuroSciVoc) Physical cosmology
- (EuroSciVoc) Particle physics
- (EuroSciVoc) Solid-state physics

## Metadata files

The screenshot shows a file manager interface with a list of system files. The files are:

Name	Size	Download all
application/vnd.plazi.v1+xml md5:b0dd7dd2e94c0a018634bbc5054e1369	27.1 kB	Download

# Domain-specific metadata



# Funding (external)



National Institutes of Health  
*Turning Discovery Into Health*



Alfred P. Sloan  
FOUNDATION



~4.5M EUR over 10 years

