

CERNopedia: CERN's Outreach through Wikipedia

Making Knowledge Accessible to all

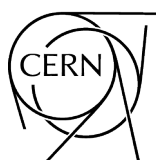


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Abstract

This project was done as part of the Summer Student Program of CERN 2021. It involved editing, updating, improving, and writing articles about CERN experiments, CERN people, and particle physics. During the 12-week project duration, there were approximately 550 edits done while interacting with about 130 Wikipedia pages. 12 new articles and stubs were created, five heavily updated, and over ten pages were updated and improved. At least four different publications or write-ups were referred for writing each of the articles. Overall, about 80 publications and write-ups have been referred to generate new content for CERN Wikipedia pages. This report contains a description of the process of writing a CERN-related Wikipedia article, why Wikipedia is an important platform, the different sources for obtaining the writing content and pictures, and a description of the type of edits done to each of the main articles involved in this project.

Contents

1	Introduction	1
2	Why Wikipedia	1
2.1	CERN's and Wikipedia's goals	1
2.2	CERN-Wikipedia page statistics	1
2.3	Audience of CERN-Wikipedia articles	3
3	Article Structure on Wikipedia	3
4	Composing a Well Written Wikipedia Write-up	4
5	Selecting Articles and New Topics	4
6	Sources of Information	4
6.1	CERN facilities and experiments	4
6.2	Particle Physics	5
6.3	People associated with CERN	5
6.4	Photos for Wikipedia Articles	5
7	Summary of Articles involved in Project	5
7.1	Topics needing attention	6
8	Conclusion	7
9	References	7
10	Acknowledgement	8

1 Introduction

Wikipedia is the encyclopedia of the current internet era and a very well-known source of medium for an enormously broad spectrum of topics. Everyone at some point in time has used Wikipedia, be it to look up some simple facts or for a complete in-depth read. Citing the sheer number of people who benefit from and use Wikipedia every day, it becomes essential for organizations like CERN to have a solid presence on this platform. The number of facilities and experiments and the physics and people involved in them at CERN is tremendous. This evidently means the information associated with it needs constant updates and constant generation of the new content. These form the motivational bases for this CERN's Outreach through Wikipedia.

The following sections in this report start with explaining more elaborately 'Why Wikipedia is an important platform?', followed by How a well-written Wikipedia write-up should look. The final sections describe the process of writing a CERN-related Wikipedia article, followed by the work done through this project.

2 Why Wikipedia

The internet is flooded with numerous different websites containing all kind of information associated with CERN and particle physics. CERN itself has web-pages dedicated to each of its experiments and facility and a regularly published CERN-Courier magazine. Which brings the question of why Wikipedia should be preferred or is crucial for CERN compared to other reading mediums.

Below are therefore some of the specific reasons explaining importance of Wikipedia.

2.1 CERN's and Wikipedia's goals

The foremost reason to improve CERN's presence on Wikipedia is because it is a step towards CERN's goals. CERN's objectives for period of 2021-25 as stated by the Director Fabiola Gianotti is to: [1]

- Deliver world-class scientific results, knowledge.
- Increase returns to the Member States and Associate Member states
- Strengthen CERN's impact on society: Necessary to increase CERN's visibility and the support of governments and the public, Strengthen scientific communication; open access to knowledge.

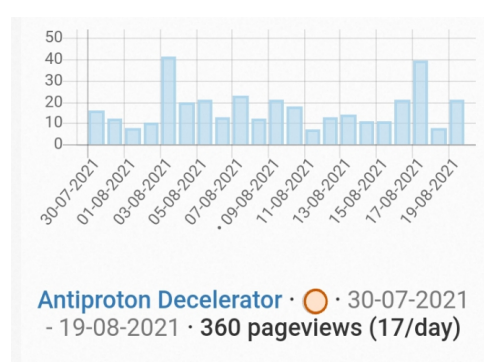
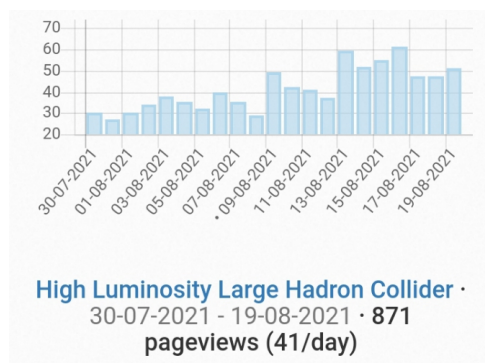
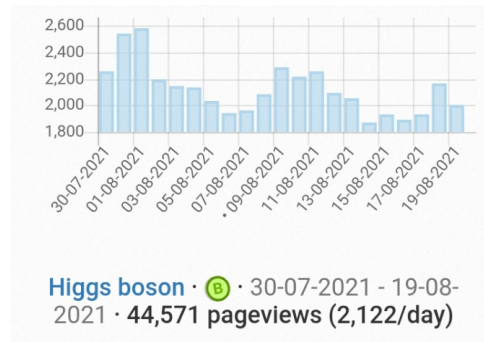
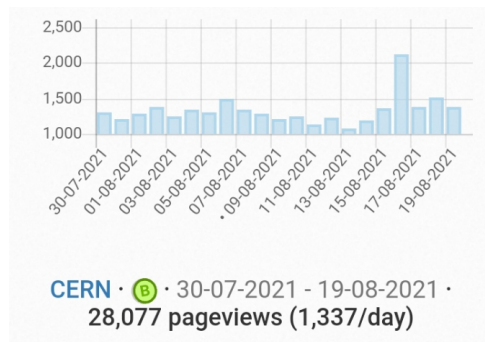
The third goal in here evidently points towards improving the science outreach sector and having a more open access to scientific knowledge at CERN. In connection with it, Wikipedia's purpose as stated by its co founder Jimmy Wales is "to have a world in which every single person on the planet is given free access to the sum of all human knowledge. That's what we're doing." While co-founder Larry Sanger says "Our goal with Wikipedia is to create a free encyclopedia; indeed, the largest encyclopedia in history, both in terms of breadth and in terms of depth. We also want Wikipedia to be a reliable resource."

This makes Wikipedia one of the most well established mediums to expand CERN's outreach through science writing.

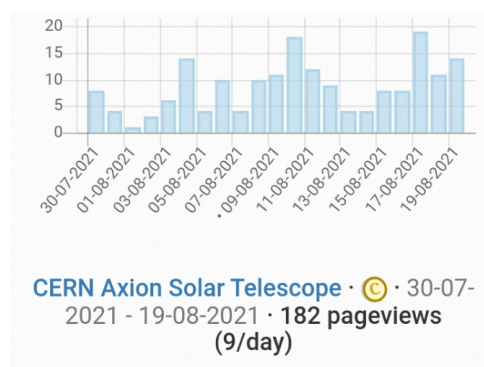
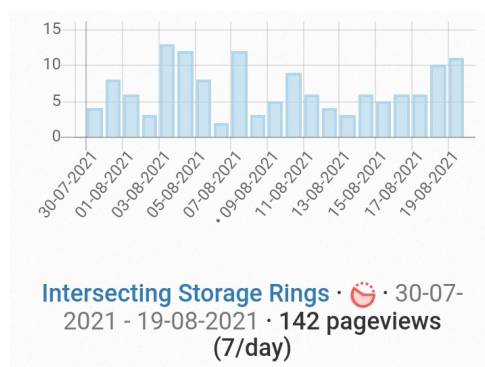
2.2 CERN-Wikipedia page statistics

Wikipedia's page statistics also explains its utility furthermore. Articles such as CERN, or Higgs Boson, or Large Hadron Collider, receive over 1000 views each day.

While the articles about smaller or yet not-well-known facilities such as the Antiproton Decelerator or High Luminosity LHC are used by about 100 people each day.



Even the smaller experiments of CERN, such as the CERN Axion Solar Telescope, or Intersecting Storage Rings has a minimum of five readers each day.



These stats points to the fact that CERN articles do no go unnoticed and are rather used by large sections of people. Thus requiring constant updates and improvements.

2.3 Audience of CERN-Wikipedia articles

The survey conducted for Wikipedia users, titled "Why We read Wikipedia" [2], found out that people use Wikipedia for range of interests and motivations. People could be looking for reading about a topic in depth or at times simply to check a fact, they could be familiar or unfamiliar with the topic. When anyone looks for CERN-related Wikipedia pages, they should be able to find the information in most comprehensive and explicable form, covering technical aspects, avoiding pretentious jargon, and yet give the needed overview of the topic and convey its importance.

Broadly speaking following the targeted audience of CERN-articles:

- **Student Community:** For those working on assignments and reports related to CERN, or students who are looking forward to be part of CERN, and in need to verified sources of information related to CERN. Wikipedia is the most approached medium in such cases.
- **General Public:** People looking up for intrinsic knowledge, wanting to have an idea about what is ongoing in the field of physics would always prefer to read a non-technical, simplified overview article on wikipedia.
- **Government and Donors:** The particle physics facilities and experiments, are always in need of fundings and grants, and are monetarily enormous. The funding agencies, the state-governments, other donors should be available to understand the significance of particle-physics research. Wikipedia write-ups about the goals and implications, technological developments serves the best in this case.
- **Media, Influencers and Activists:** There has always been news in the media about the largest hadron collider capable of 'destroying earth' or antimatter at CERN creating chaos. None of those things are even close to reality. Such news arises from the spread of mis-information and mis-interpretations, and could prove detrimental to existence projects or to proposals due to oppose from the communities. Wikipedia can play huge role in avoiding such mis-information as making the knowledge accessible to all is its goal.

3 Article Structure on Wikipedia

Wikipedia's content presentation is very systematic and follows some 'strict' wiki rules. This also makes the Wikipedia pages and very organized and easy to follow. The divisions into sections and subheadings, hyperlinks and templates/infoboxes, and inline references to verify the content, are necessary to have a well-structured and complete article.

Any article always starts with a short introduction, followed by more elaborate dedicated sub-sections. Followed by the main sections are 'See also' and 'External links' sections linking the current article of other associated topics on and outside Wikipedia. Such sections help the readers get a more in-depth overview of topics associated or compared with the current topic. Every article also has a reference section to club the inline citations at the end. A 'good' Wikipedia article mandatorily has inline citations.

CERN experiment articles composed in this project were divided into sections such as 'History/Background,' 'Physics Goals', 'Detector/Machine Description/Experimental Setup,' 'Results/Legacy.' While biographies have been into a short 'Introduction,' 'Research and Career,' 'Achievements and Recognition.' The particle physics articles had varying divisions based on the requirements of each article.

Wikipedia is primarily for those seeking a simplified yet complete description of a topic. For which the technical jargon should be avoided unless necessary.

The following section briefly describes the process of writing a CERN-related Wikipedia article.

4 Composing a Well Written Wikipedia Write-up

The first step is to go through the page which introduces one to [Wikipedia editing rules and policies](#) and describes [different stages of Wikipedia editors](#). The next step is to find an article that needs improvement or find an un-existing topic on Wikipedia. Following which the process of reviewing the existing text of Wikipedia and finding sources of information to expand and improvise the content. One typically should read at least two different pieces of information before writing that content on Wikipedia. The next step is to go back to existing information and read even more till one feels they can write about it in their own writing style. Beware that the write-up should be conveyed in a neutral and unbiased manner according to wiki rules.

Once the improvements and edits are implemented, the article should be reviewed for grammatical corrections and errors in facts. CERN articles can be examined with the help of experts at CERN.

Few other things include adding the article to '[categories](#),' cleaning the citations using '[Citation bot](#),' fixing dead links using [this tool](#), and finally also checking how the article appears on a mobile device.

5 Selecting Articles and New Topics

There are tons of Wikipedia articles that need improvements, new updates, more content, or sometimes simplification in language. The usual idea is to start with topics suggested by the guide and move on as per your own interests.

One can start looking at [this list of CERN experiments](#) and find an article that looks too short or has not been updated for quite long. This list of particle physics stubs could also be a great way to start.

While reading any Wikipedia article, if there are any 'red-marked words (Which means a Wikipedia page is needed on that topic) or words that are not hyperlinked despite being very technical, they could be a new topic to write about.

6 Sources of Information

There are lots of websites available with information on CERN-related topics. However only few would be accurate, concise and complete. Following is the list of such sources for different types of articles.

6.1 CERN facilities and experiments

The single primary source for an article related to CERN experiments is [CERN Document Server \(CDS\)](#). Almost all documents such as the 'Letter of Intent,' 'Technical proposal,' 'Technical Design Report,' 'Status Reports' are available here. These reports are pretty helpful for getting a very detailed view of the experiment's set-up, timeline, and goals.

For a more physics-based description of an experiment, the majority of the publications can be obtained through [INSPIRE-NET](#). INSPIRE has simple yet efficient ways to search and filter publications.

Nevertheless, most of the time, the information in the technical publications gets too complicated to comprehend. In which case, there are sources like the [CERN-Courier](#) with lots of articles written by the science communicators. These articles can be cited on Wikipedia and give a brief and crisp idea on the required topic.

Moreover, there is also [CERN-HOME](#) with many short articles on all the experiments associated with CERN.

6.2 Particle Physics

For writing a more general particle physics article, such as 'Fixed-target experiments' or 'Stable Massive Particles,' the starting way would be to look through the previously mentioned sources. Additionally, there are websites and search engines such as [Symmetry Magazine](#), [Google Scholar](#), [Physics World](#). Again, for these types of topics, the doctoral thesis(from CERN-CDS) can be highly detailed to understand the essential aspects.

6.3 People associated with CERN

The sources for biography-type articles are the interviews, 'about the speaker' sections of conference or award websites, and the university websites belonging to the particular person. Some more information about their physics may be available on [Orcid](#) or on their [Research Gate](#) profiles. If the person has authored any book, then that could be another primary source of information too.

6.4 Photos for Wikipedia Articles

The most reliable source for pictures is again the CERN-CDS. These pictures can be uploaded and used on Wikipedia once they are licensed under the CC-BY-4 license.

7 Summary of Articles involved in Project

I interacted with 130 Wikipedia pages during this Project and over 550 edits. 12 new pages were created while about five were extended elaborately, and 36 new images were uploaded on Wikipedia. Some minor edits such as adding hypelinks or adding categories, templates and images was done to rest of the pages. The list below summarises the major work done.

Article	Description
High Luminosity Large Hadron Collider	• Created new sections for Project timeline, Physics goals, Accelerator upgrades, Injector upgrades and Upgrades to experiments. • The article was reviewed by Dr. Oliver Bruning's and improved further
Antiproton Decelerator	• Created new sections for AD's History and Decelerator description • Created new section for ELENA decelerator (and moved it to new page) • Created new pages for all 9 AD experiments, cleaned, improved, and extended some content, and added new images. • Created new article for AD-9 PUMA experiment
ELENA	Created new section for ELENA decelerator description and a (and moved it to its current new page)

Article	Description
AD experiments	- Created new pages for all 9 AD experiments. Cleaned,improvised, and segregated the text and added images on each page AeGIS, ACE, ASACUSA, GBAR: extended content in experimental setup or physics sections PUMA: Wrote a short new article.
Intesectioning Storage Rings	Wrote new content for Accelerator physics, Collaborations and Legacy of ISR sections.
TRAP experiment	Created the new article with introduction, experimental setup and results sections.
CERN Axion Solar Telescope	Created sections and wrote content for all the CAST-detectors and CAST-Results
International Axion Observatory	Wrote the entire article that includes Introduction, BabyIAXO, Physics Potential, Experimental setup, and Sources accesible sections
Scattering and Neutrino Detector	Created new article with Introduction, Physics goals and Detector sections
Search for Hidden Particles	Created new article with Introduction, Physics goals
NA64 experiment	Created a stub
Fixed-target experiment	Created new article with Introduction, Explanation, Physics facilities and Physics at fixed-target facilities sections.
Stable Massive Particle	Created new article
Nuclearites	Created new article
Feebly Interacting Particles	Created a stub
Flavour Problem	Wrote the short section
Jeffrey Hangst	Created new article
Stefan Ulmer	Created new article

Category Pages	- Created Category:Fixed-target experiments Category: CERN facilities Populated this page
Templates	Created 3 new templates AD experiments Antimatter facilities LEP Collider experiments

Finally, following is also a list of articles/topics that I am came across during the project-duration but could not pull out enough time to extent, improvise or create and this pages.

7.1 Topics needing attention

- [Low Energy Antiproton Ring](#): This is currently just a stub.
- [Legacy experiments at LEAR](#) such as ASTERIX, Crystal Barrel, OBELIX, JETSET, CPLEAR, and few other given in link above needs at the least a simple article similar to [TRAP experiment](#). Once this pages are created a category page for Antimatter experiments can also be created.

- [DIRAC experiment](#) : needs a new page
- [Search for Hidden Particle experiment](#), A stub, needs more content
- [DELPHI experiment](#) : A stub, needs expansion
- [ALEPH experiment](#), [OPAL experiment](#), and [L3 experiment](#): Needs a better introduction and sections such as its physics goals and and results.
- Heavy Neutral Leptons: Does not have a page.
- [Feebly Interacting Particles](#): Only a stub, needs expansion.
- OSQAR experiment: needs a new page
- [ISOLDE](#): needs a section describing different experiments at this facility

8 Conclusion

Science writing is one of the best ways, not just for science outreach but also an opportunity for the writer/students to learn in-depth about a topic by themselves. The Wikipedia article requires the writers themselves to know about a topic in all details while writing about it for others in an explicable and simplified form.

In this project articles from varied domains such as Antimatter, Astroparticle, Neutrino physics, Colliders were covered. Utmost care was taken in verifying all the facts, in following the Wikipedia rules and Wikipedia writing style, in presenting the composition in as simple form as form, and in covering all crucial aspects of a topic.

9 References

- [1] *CERN's main objectives for the period 2021-2025. Video-meeting: Scientific Policy Committee - Three-Hundred-and-Twenty-First Meeting* (Mar. 2021),
URL: <https://cds.cern.ch/record/2759413>.
- [2] P. Singer *et al.*, *Why We Read Wikipedia*,
Proceedings of the 26th International Conference on World Wide Web (Apr. 2017),
DOI: [10.1145/3038912.3052716](https://doi.org/10.1145/3038912.3052716),
URL: <http://dx.doi.org/10.1145/3038912.3052716>.

10 Acknowledgement

I am deeply pleased to thank my supervisor, Mr. Jens Vigen, who guided me in all ways possible, selected topics that really helped me learn and explore and let me enjoy my virtual summer at CERN. More gratitude to Jens, for letting me learn so much about writing on Wikipedia, and its only because of his guidance that I would continue to contribute to Wikipedia beyond this project as and when possible.

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