

Sharing ATLAS Science: Communicating to the Public

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Abstract. Communicating the science and achievements of the ATLAS Experiment is a core objective of the ATLAS Collaboration. This contribution will explore the range of communication strategies adopted by ATLAS. In particular, an overview of ATLAS' digital communication platforms will be given, including the ATLAS website, social media, Virtual Visits, and Open Data.

1 Introduction

The ATLAS Collaboration at CERN places a high importance on quality science communication. Many ATLAS physicists consider it their responsibility to share their passion for physics with a variety of audiences in order to inspire others – especially young students – to pursue science exploration, particularly in particle physics, as well as educate funding agencies and the general public to gain their support. The ATLAS Collaboration takes a diversified approach to reach a wide and varied audience, with tailored content on multiple platforms, including the ATLAS website, social media, printable material, Virtual Visits, and Open Data.

2 ATLAS outreach group

The ATLAS detector [1] is a general purpose experiment of the LHC which studies the Standard Model and its possible extensions. The ATLAS Collaboration has published over 1,000 papers so far, with topics ranging from precision measurements to searches for new physics to data analysis methods [2]. The ATLAS outreach group plays an integral role in making these results known to the public. It is a formal working group within the ATLAS collaboration, led by two elected co-coordinators holding staggered two-year terms [3]. Any member of the ATLAS Collaboration is welcome to join the outreach team and contribute as much or as little as they are able. The group is additionally supported by a Communications Manager and a student specializing in science communication. As such, the efforts presented here are the product of the collaboration between ATLAS members from a variety of backgrounds and career stages.

3 ATLAS Website

The ATLAS website [4] has many resources for the general public to learn more about the collaboration's science and scientists. The content is divided into four main sections, which show up as navigation tabs at the top of the main page:

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- **ABOUT:** contains a broad explanation of the ATLAS Detector and Collaboration.
- **DISCOVER:** holds more detailed information about the detector components, ATLAS physics and technology, how the collaboration is organized, how to visit CERN, etc.
- **RESOURCES:** catalogs all ATLAS-related outreach materials, such as schematics of the detector, posters, fact sheets, books, etc.
- **UPDATES:** includes all content related to current events, such as news pieces, briefings, blog posts, etc.

All this allows visitors of the website to easily access the information they want, whether they have just heard about ATLAS or are experts in particle physics. In addition, ATLAS occasionally collaborates with the CERN communication team to feature ATLAS news and briefings on the main CERN website [5], which helps attract more viewers to the ATLAS website.

In terms of infrastructure, the ATLAS website is managed using the Drupal 9 content management system. It uses the CERN theme but with an ATLAS look and feel, which supports most devices, platforms, and screens. Statistics about the website, such as the number of users and sessions, the average duration of a session, and the number of pages viewed per session, are constantly recorded. Figure 1 shows some of these statistics from June 1st, 2016 to May 10th, 2023. Overall, the number of sessions per day has grown steadily over the past 6 years, with occasional spikes due to important events such as the Run 3 LHC restart on July 5th, 2022.

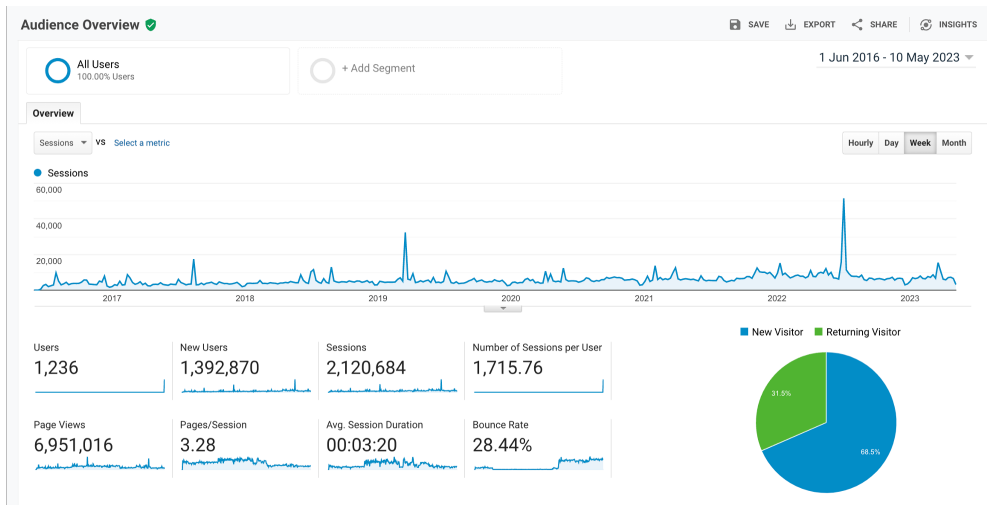


Figure 1. Statistics for the ATLAS website between June 1st, 2016 and May 10th, 2023.

4 Social Media

Social media provides an opportunity to reach a wider and more diverse audience than the website alone. The ATLAS Collaboration has official accounts on all major platforms: Twitter/X [6], Instagram [7], Facebook [8], TikTok [9], YouTube [10], and LinkedIn [11]. At the time this work was presented, the platform with the largest number of followers was Twitter/X, with 98,000. The content posted on each account is adapted to the platform and its

target audience. For example, posts on YouTube are often longer videos, such as Virtual Visits of the detector, or talks given by ATLAS physicists. They generally target older audiences who are already interested in particle physics and want to learn about ATLAS in more detail. On the other hand, TikTok posts consist of very short and often humorous videos meant to catch the eye of younger audiences who may have never heard of ATLAS. Some recent social media releases include a live visit to the ATLAS Control Room on YouTube [12], and a set of videos to accompany the CERN press release of the W mass measurement [13, 14].

5 Educational printables

As mentioned in Sect. 3, the “Resources” section of the ATLAS website makes a wide range of educational materials for all ages and levels of expertise publicly available. These resources are also translated into as many languages as possible in order to make them more accessible.

The ATLAS coloring books and activity sheets are aimed at introducing children to particle physics through simple language and engaging characters. The “ATLAS Experiment Colouring Book”, which was the first ATLAS educational resource for children, is now available in 21 languages. The more recent “Particles of the Universe” book is available in 11 languages. The activity sheets, available in 7 languages, are an extension of the second coloring book and come with a comprehensive parent/teacher guide.

ATLAS also provides printable resources for more advanced audiences. The ATLAS Fact Sheets cover topics such as the detector subsystems and magnets, the ATLAS Collaboration, and the Higgs Boson. The ATLAS Cheat Sheets are more focused on particle physics concepts such as conservation laws, signal and background, cross section and luminosity. Both of these types of sheets are particularly useful for students and teachers, and could for example be used as posters in classrooms. 10 Fact Sheets are currently available in 4–7 languages (depending on the sheet) and 6 Cheat Sheets are available in 3–5 languages.

6 Virtual Visits

ATLAS Virtual Visits [15] are a way to bring the excitement of scientific exploration and discovery to classrooms and public spaces around the world. They are “virtual” in that the visitors are not physically present at CERN, but the guide is on-site with a video camera and a Zoom connection to show the audience around, as if they were walking with him/her. In certain instances, the visit is also livestreamed to other platforms such as YouTube. The most common audiences are students and teachers, from primary schools to universities, but other types of audiences include distinguished guests of CERN, science festival attendees (especially during the pandemic), and more. Since 2021, some virtual visits are made “open”, such that individuals can sign up without being part of an organized group. 13 Open Virtual Visits have been conducted so far, including three in languages other than English. One of the goals of the Virtual Visit program is to reach audiences all around the world, therefore the ATLAS Collaboration puts in considerable effort to find a guide who speaks the language requested by the visitors. In 2022, 121 Virtual Visits were conducted, spanning 35 countries on all continents and 8 different languages, as illustrated in figure 2.

7 ATLAS Open Data

The ATLAS Collaboration has released a portion of its 8 TeV (Run 1) and 13 TeV (Run 2) data for the purpose of outreach and education. Along with the data, many analysis tools are



Figure 2. Countries of origin of Virtual Visit bookings in 2022.

provided for various levels of expertise. The most basic tool is the “histogram analyzer” [16], which is an interactive web application which demonstrates the principles of a cut-and-count analysis without requiring any coding (see figure 3). For users who wish to learn about programming while analyzing the data, a variety of Jupyter notebooks are provided in C++ or Python. In addition, virtual machines are available if users want to work in a specific environment without the need for heavy installations on their personal computer. Along with the tools, the ATLAS Open Data team provides detailed documentation through their website [17], github repository [18], and video tutorials on YouTube [19]. These resources are most used by high school or undergraduate students for labs or research projects and were found to be a particularly good option for remote learning during the pandemic.

8 Conclusion

The ATLAS Collaboration has developed many resources to communicate its science to the general public. A wide audience is reached through tailored content on a variety of platforms, in particular the ATLAS website, official ATLAS social media accounts, educational printable resources, Virtual Visits, and the ATLAS Open Data and associated tools. All of these efforts are aimed at making particle physics approachable and fun for all.

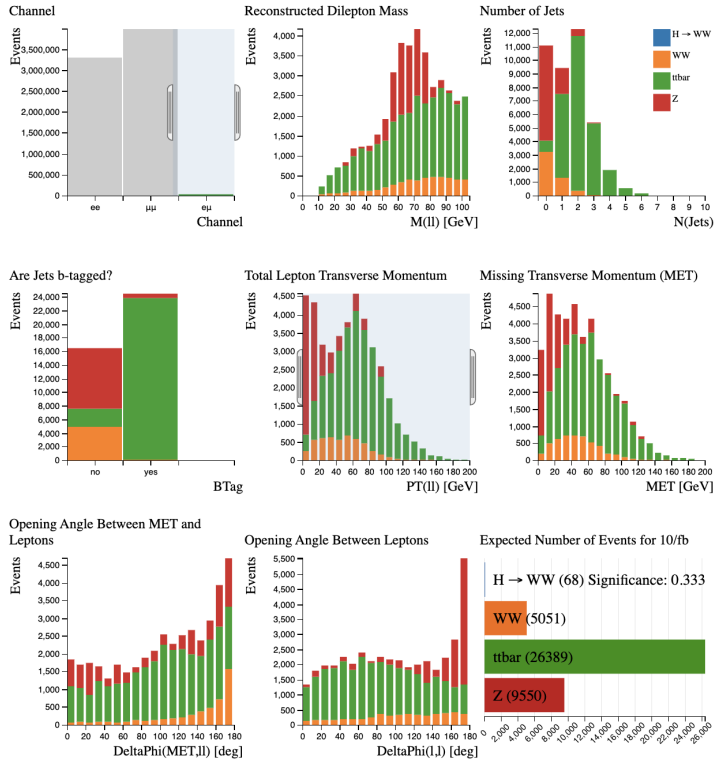


Figure 3. Screenshot of histogram analyzer tool for ATLAS Open Data.

References

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