

Recent Updates to the Popular ATLAS Virtual Visit Programme

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Abstract.

Virtual Visits have been an integral component of the ATLAS Education and Outreach programme since their inception in 2010. Over the years, collaboration members have hosted visits for tens of thousands of visitors located all over the globe. In 2024 alone, there have already been 59 visits through the month of May. Visitors in classrooms, festivals, events or even at home have a unique opportunity to engage with scientists located underground in the ATLAS experimental cavern or in front of the control room to learn about the goals and achievements of the collaboration. As part of the renovation of the ATLAS Visitor Centre at LHC Point 1, a new installation was constructed to facilitate Virtual Visits during the running of LHC. We present the overall programme and the latest installation and discuss recent initiatives to expand our reach, including Open Visits on ZOOM, Facebook, YouTube and TikTok Live.

1 Motivation

Public engagement is a key priority for the scientific community. The virtual visit programme of the ATLAS Experiment at CERN uses the full potential of video conferencing to reach global audiences who cannot visit in person [1]. It offers the public a chance to explore cutting-edge particle physics research while helping to bridge the gap between science and society, highlighting the importance of this connection [2]. The programme is designed to bring the excitement of scientific discovery into classrooms, providing students of all ages, backgrounds, and education levels with visual resources for particle physics [3].

2 Introduction

The ATLAS Experiment's virtual visit programme, launched in 2010, has been running for 15 years. These virtual visits are designed to be interactive, engaging, and dynamic [4]. They primarily use video conferencing platforms, particularly ZOOM, for group visits and social

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media platforms like YouTube, Facebook, Instagram and TikTok Live [5–8] for open visits [9].

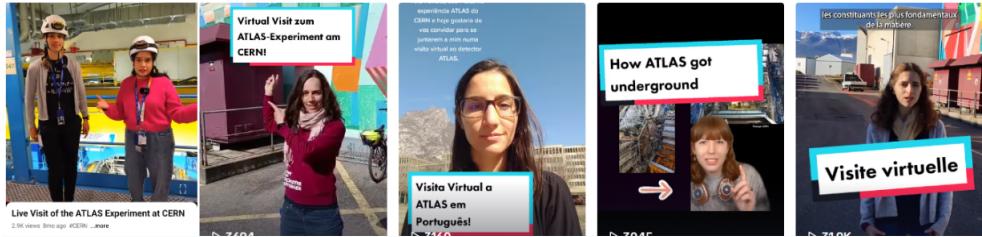


Figure 1. ATLAS live open virtual visits on YouTube and TikTok

3 Procedure

Virtual visits begin with an introduction from the hosts, who share their background and role in the ATLAS Collaboration. Then, it is followed by an explanation of the experiment and its subdetectors, and finally, a discussion covering various aspects of the physics programme, technologies, and applications [2]. Requests for virtual visits are made through a booking system, described in *ATLAS Virtual Visit Request Form* [10], where hosts are matched with groups based on language and audience background. In addition to private group visits, ATLAS collaboration also offers open virtual visits. An open virtual visit is a scheduled, advertised event that allows individuals a chance to connect from wherever they are located. These activities are held several times a year, mainly during the LHC’s technical shutdowns. While the main focus is the ATLAS experiment, joint visits with other experiments may also be arranged. The duration of each visit is typically an hour.

4 ATLAS Cavern

The primary location for these virtual visits is the ATLAS detector cavern. Virtual cavern tours are available during the LHC’s year-end technical shutdown or when access is granted during operational periods. The ATLAS cavern virtual tours provide a rare opportunity to showcase a "behind-the-scenes" look at the technology at CERN and parts of the experiment that are usually restricted to staff [11].

The required equipment for virtual visits consists of a smartphone and noise-cancelling earphones. Occasionally, a tripod and extra microphones are included to enhance video quality, and laptops may be used to share additional media content.

During the virtual tour, the ATLAS guide typically begins on the surface, explaining how to access the cavern before leading the audience on a tour of the detector. Key features such as the toroidal magnets and subdetectors are highlighted. A Q&A session is held in the final 15-20 minutes, although participants can ask questions throughout the visit.

5 ATLAS Visitor Centre

The ATLAS Visitor Centre (AVC) offers a flexible schedule beyond standard working hours. Located next to the ATLAS Control Room (ACR), the AVC features opaque windows that

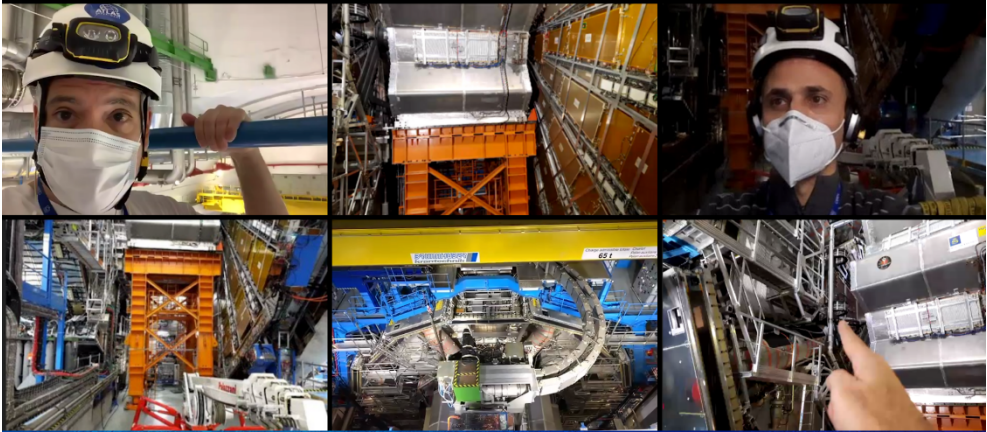


Figure 2. ATLAS virtual visit for Australian National Youth Science Forum (January 2023), host by Dr Goldfarb and Dr Allhroob



Figure 3. ATLAS Visitor Center (photos by Ordan J 2021 [13])

can be transparent, allowing visitors to view inside the control room. The centre has numerous interactive screens and exhibits that provide detailed information about the ATLAS subdetectors [12].

A new audio-visual system, as shown in figure 4, has recently been installed and tested to enhance the quality of virtual visits. Two HD cameras are integrated into AVC and ACR, which can be remotely controlled via a tablet, allowing angle adjustments, zooming in or out, etc. This setup also enables hosts to easily connect to ZOOM meetings through the tablet and view the audience on a large screen on the wall, eliminating the need for a personal smartphone.

6 Statistics

In the past 15 years, the ATLAS virtual visit programme has engaged thousands of participants from all the continents, including Antarctica, and in multiple languages. Each visit



Figure 4. An ATLAS virtual visit host by Dr Muhammad Alhroob using the new audio-video system at the AVC [14]

typically hosts between 10 and 600 participants. Open visits for individuals are offered regularly [2, 14].

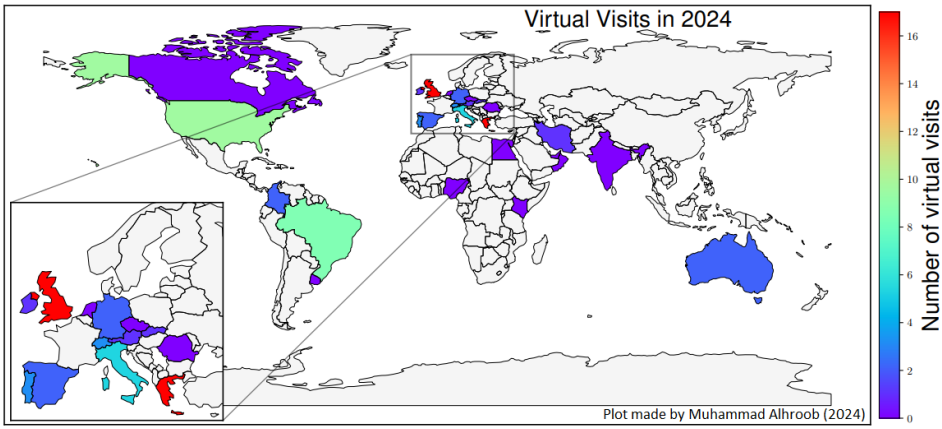


Figure 5. Virtual visits by countries in 2024

6.1 Visits by country

Over the past five years, the UK, Brazil, and the US have led in the number of virtual visits, as seen in Figure 6a. From January to November 2024, 101 visits were requested from 27 countries. This surpasses the 87 visits from 31 countries recorded in 2023. As shown in figure 6b, in 2024, the UK and Greece are tied at the top, each with 17 visits.

6.2 Visits by language

Over the years, English has been the most requested language for virtual visits. Alongside English, the other most commonly used languages between 2019 and 2024 were Portuguese, Spanish, French, German, Greek, and Italian (figure 7a). In 2024, 52% of the visits were offered in English. Notably, 2024 has also seen a rise in virtual visits requested in languages other than English, as shown in Figure 7b).

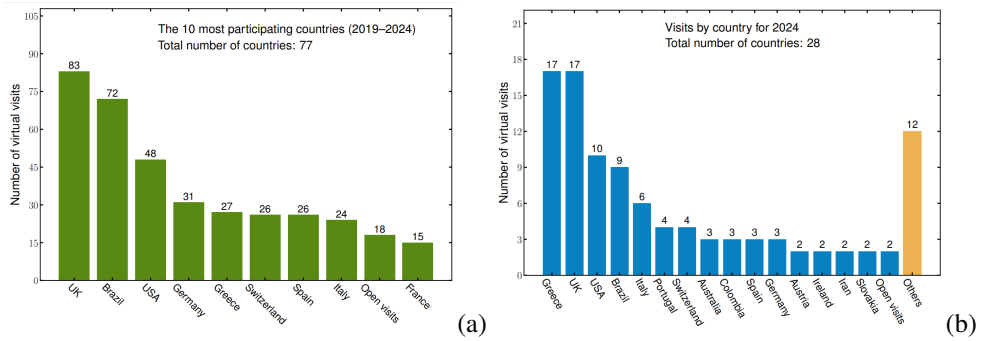


Figure 6. The most ten participating countries between 2019 and 2024 (a), and the number of virtual visits by country between January and November 2024 (b)

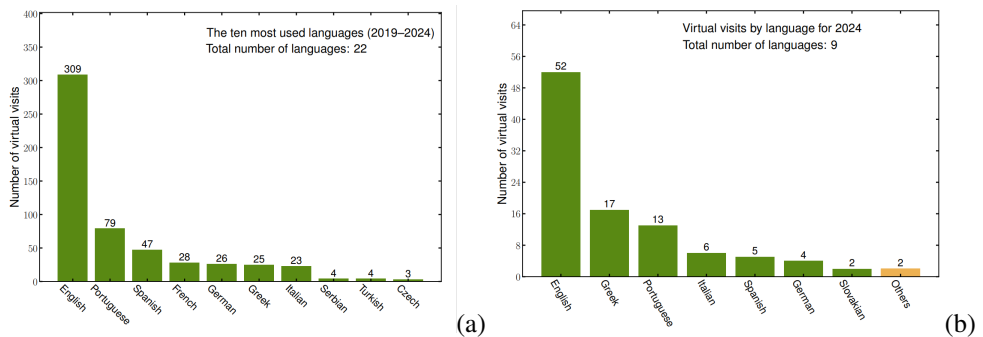


Figure 7. The most ten participating countries between 2019 and 2024 (a), and visits by language in 2024 (b)

6.3 Annual and monthly visits

Figure 8a presents the total number of ATLAS virtual visits in the last six years, while figure 8b illustrates the monthly distribution of visits in 2024. There was a significant decline in 2020 due to the pandemic, followed by a sharp increase in 2021 due to the shift to remote engagement. Figure 8b presents the monthly visit count for 2024, up to November. The peaks in February and June are attributed to cavern access and the International MasterClasses, while the summer drop reflects the seasonal break.

7 International MasterClasses

The International MasterClasses (IMC) [15], in partnership with IPPOG, engage 13,000 high school students across 60 countries, offering over 200 opportunities for participation. Students gain insight into the methods and topics of fundamental research on matter and forces, perform measurements on real CERN experiment data, and join an international video conference to discuss their results [16].

As part of IMC, ATLAS’s virtual visit programme introduces particle physics to students from diverse backgrounds, including those in remote areas and war zones.

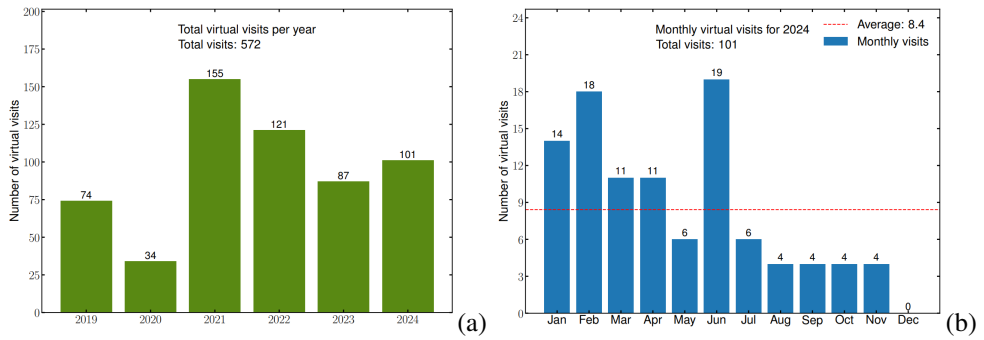


Figure 8. Total visits per year between 2019 and 2024 (a), and monthly visits in 2024 (b)

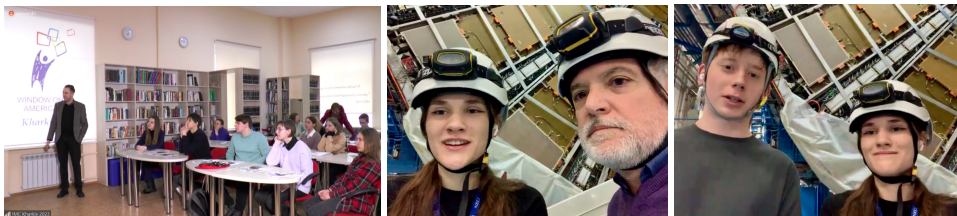


Figure 9. Dr Goldfarb and Ukrainian students Tiulchenko & Boreiko hosted an ATLAS virtual visit for the International MasterClasses in Kharkiv, April 2023 [17].

8 Conclusion

The ATLAS collaboration has actively engaged the public through group and open virtual visits across various media platforms. The ATLAS virtual visit programme effectively leverages video conferencing technology to reach global audiences with diverse backgrounds, including differences in country and language. It offers valuable learning opportunities for classrooms worldwide, including those in remote areas. This initiative enhances public access to the ATLAS experiment, highlighting its scope and global impact.

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