



Visiting CMS from your living room (virtually!)

Noemi Beni, Zoltan Szillasi
on behalf of CMS Collaboration

ICHEP2024, Prague, Czech Republic



In a classroom in
Budapest...

- Get the children excited about science / CERN / physics
- Cannot access CERN because of money / logistics

Our aim became:

- Accessible
- Interactive
- Flexible
- Multilingual
- Talk to a real scientist
- Inspirational & relatable guide
- Inclusive

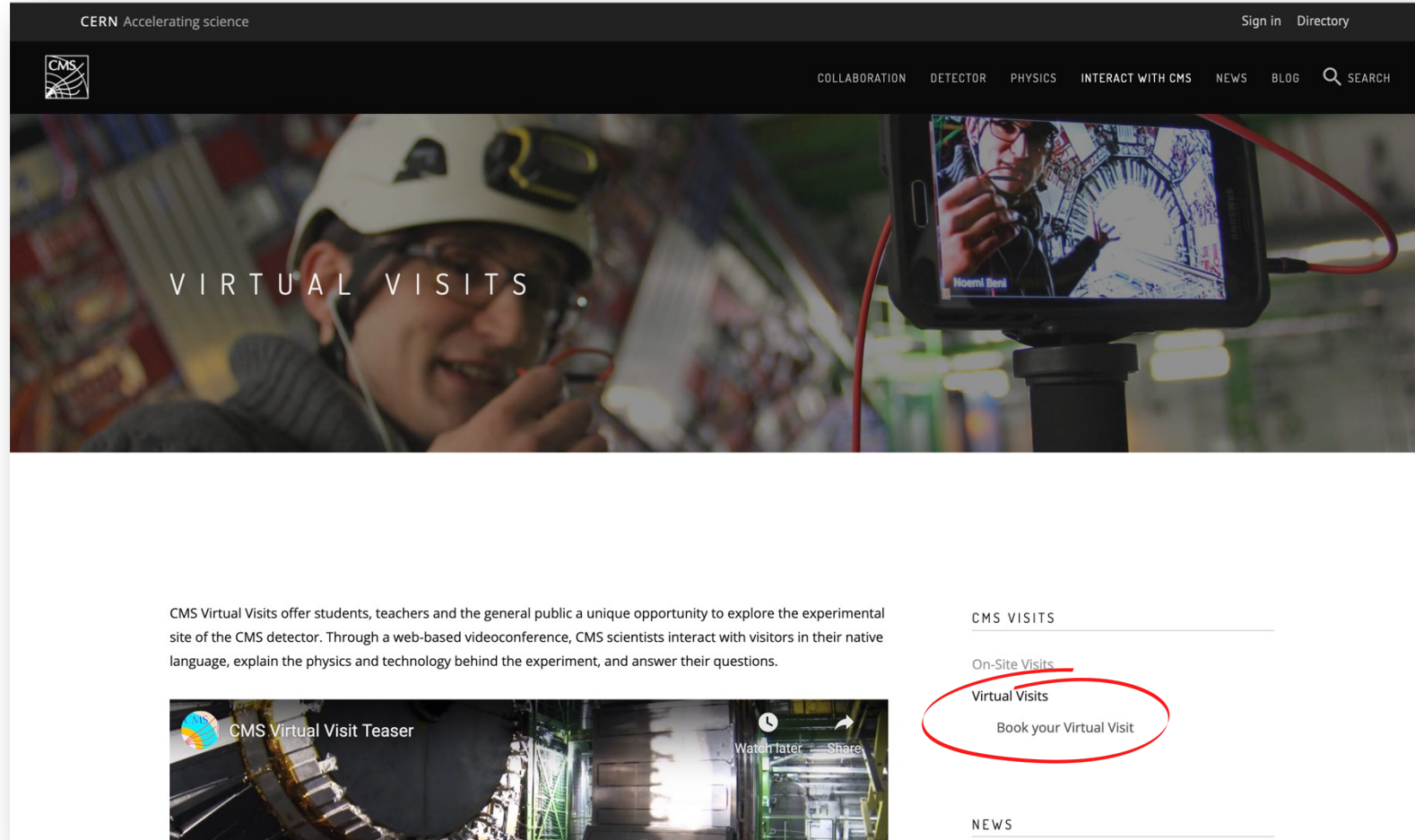
What is a virtual visit?

- Visit the CMS experiment via videoconference software
- As an extra to the physical guided tour virtually people can visit those places which are not allowed for visitors, but safe for workers
- Requirements for equipment
 - In case there is a venue (school, university, festival, ...)**
 - **To be able to establish audio / video connection with visitors the place need to be equipped with:**
 - High speed wired internet connection
 - Projector or big display
 - Noise cancelling microphone
 - Good quality camera
 - No venue available – from home**
 - One way audio / video connection, visitors not able to send audio /video but can interact via Q&A session of zoom → security
 - The attendees of the virtual visit can connect from anywhere to the webinar room even from home
 - If possible, we ask to have a convener (in case of school, university we establish 2-way audio / video connection with local organizer)
 - We always ask for a technical test / discussion with the local organizer minimum one week before the virtual visit is scheduled



How to request a virtual visit

- **CMS virtual visit webpage:**
<https://cms.cern/interact-with-cms/virtual-visits>
- Requirements can be found on this page
- The form can be found on the "Book your virtual visit" link.
- We ask to request a visit a group from ~10 people
- In case we receive request from a group below this number we offer them open virtual visit which we organise regularly and timed to a period when the experimental cavern is accessible.



The screenshot shows the CMS website interface. At the top, there is a navigation bar with the CMS logo and links for 'COLLABORATION', 'DETECTOR', 'PHYSICS', 'INTERACT WITH CMS', 'NEWS', and 'BLOG'. A search icon is also present. Below the navigation bar is a large banner image featuring a person wearing a hard hat and safety glasses, looking at a tablet. The text 'VIRTUAL VISITS' is overlaid on the banner. Below the banner, there is a section titled 'CMS VISITS' with a list of options: 'On-Site Visits', 'Virtual Visits', and 'Book your Virtual Visit'. The 'Virtual Visits' option is circled in red. Below this section, there is a video player titled 'CMS Virtual Visit Teaser' with 'Watch later' and 'Share' buttons. The bottom of the page shows a 'NEWS' section.

CERN Accelerating science

Sign in Directory

COLLABORATION DETECTOR PHYSICS INTERACT WITH CMS NEWS BLOG SEARCH

VIRTUAL VISITS

CMS Virtual Visits offer students, teachers and the general public a unique opportunity to explore the experimental site of the CMS detector. Through a web-based videoconference, CMS scientists interact with visitors in their native language, explain the physics and technology behind the experiment, and answer their questions.

CMS VISITS

On-Site Visits

Virtual Visits

Book your Virtual Visit

NEWS

CMS Virtual Visit Teaser

Watch later Share

Indico page of the CMS virtual visit

The screenshot shows the Indico CMS Virtual Visits page. At the top, there is a navigation bar with 'Home', 'Create event', 'Room booking', and 'My profile'. Below this, a search bar is present. The main content area displays a calendar of events. The current month is June 2024. Events listed include: 15 Jul CMS Virtual Visit with USA, 24 Jun CMS Virtual Visit with Italy - date not yet fixed, 13 Jun CMS Virtual Visit SciencEstate, 12 Jun CMS Virtual Visit SciencEstate, 11 Jun ATLAS AND CMS OPEN VIRTUAL VISIT, 06 Jun CMS Virtual Visit with Pakistan, and 13 May CMS Virtual Visit with Brazil. A summary at the bottom indicates 'There are 508 events in the past.' The footer includes the CERN logo, 'Powered by Indico v3.3.3-pr3', and links for 'Help', 'Contact', 'Terms and conditions', 'URL Shortener', and 'Privacy'.

This screenshot shows the 'CMS Virtual Visit with USA' page. It features the US flag and the title 'CMS Virtual Visit with USA'. The event is dated '10 May 2022' at 'CERN'. A search bar is located at the top right. The page is divided into sections: 'Overview' (with a description of the SPD research group), 'Guides' (with a list of guides), and 'Connection' (with a list of links for recorded events, CMS posters, facts about CMS, CMS posters, CMS posters (HG), for print, TSD-G4 animations, lessons worth sharing, and CMS matter). A large image of the UMD Physical Sciences Complex is shown. The footer includes the event start and end times, location (CERN), and a list of links for recorded events, CMS posters, facts about CMS, CMS posters, CMS posters (HG), for print, TSD-G4 animations, lessons worth sharing, and CMS matter.

This screenshot shows the 'CMS Virtual Visit from Spain' page. It features the Spanish flag and the title 'CMS Virtual Visit from Spain'. The event is dated '12 February 2020' at 'CERN'. A search bar is located at the top right. The page is divided into sections: 'Overview' (with a list of guides), 'Guides' (with a list of guides), and 'Connection' (with a list of links for recorded events, CMS posters, facts about CMS, CMS posters, CMS posters (HG), for print, TSD-G4 animations, lessons worth sharing, and CMS matter). A large image of a guide is shown. The footer includes the event start and end times, location (CERN), and a list of links for recorded events, CMS posters, facts about CMS, CMS posters, CMS posters (HG), for print, TSD-G4 animations, lessons worth sharing, and CMS matter.

This screenshot shows the 'CMS Virtual Visit from Latvia' page. It features the Latvian flag and the title 'CMS Virtual Visit from Latvia'. The event is dated '7 November 2020' at 'CERN'. A search bar is located at the top right. The page is divided into sections: 'Overview' (with a list of guides), 'Guides' (with a list of guides), and 'Connection' (with a list of links for recorded events, CMS posters, facts about CMS, CMS posters, CMS posters (HG), for print, TSD-G4 animations, lessons worth sharing, and CMS matter). A large image of a guide is shown. The footer includes the event start and end times, location (CERN), and a list of links for recorded events, CMS posters, facts about CMS, CMS posters, CMS posters (HG), for print, TSD-G4 animations, lessons worth sharing, and CMS matter.

- Customized persistent indico page created for each virtual visit. <https://indico.cern.ch/category/5975/>
- Source materials about CMS experiment attached to the page
- Sub-page with the names, picture and short bio of the guides
- Connection details page
- Made by the back office

CMS virtual visit YouTube channel

- Record each virtual visit and publish on CMS virtual visit YouTube channel
<https://www.youtube.com/@virtualvisitcms3825>
- Only if the local organiser and the visitors agree
- The local organizer has to make sure that people who appear in the camera view on their site agree to be filmed → respect privacy and concerning rules**

The screenshot shows the YouTube channel page for 'virtualvisit cms'. The channel name is 'virtualvisit cms' with the handle '@virtualvisitcms3825', 283 subscribers, and 169 videos. The page displays a grid of video thumbnails with titles and view counts. The videos are:

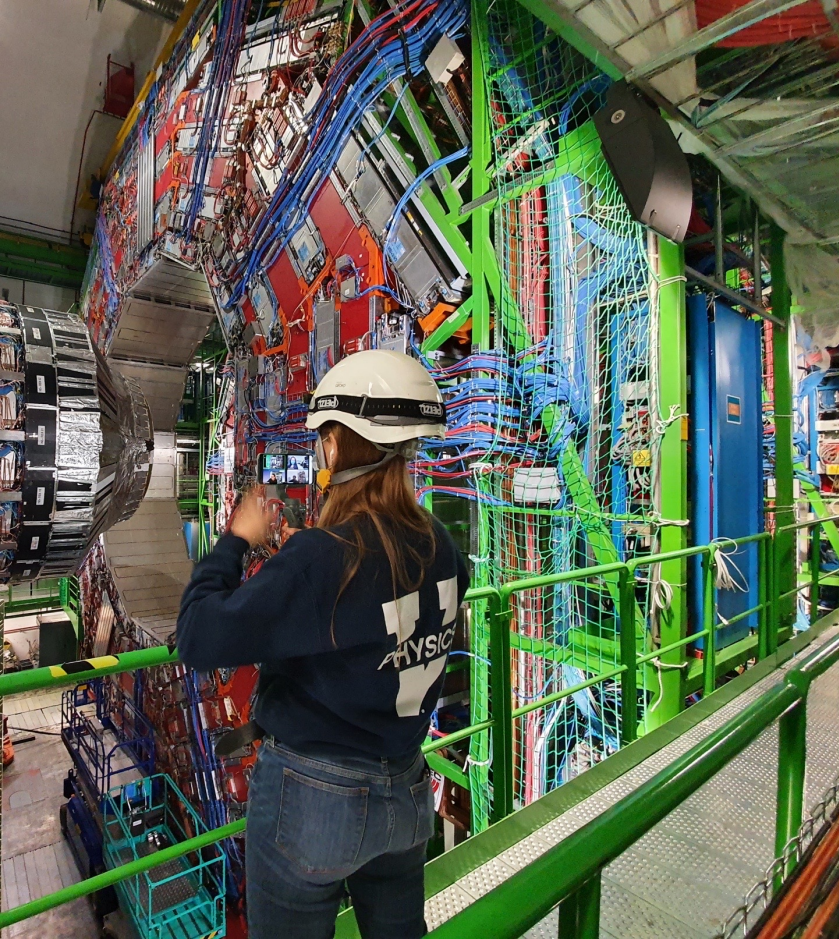
- CMS Virtual Visit from Italy, 2024.06.13. (13 megtekintés • 1 hónappal ezelőtt)
- CMS Virtual Visit from Italy, 2024.06.12. (11 megtekintés • 1 hónappal ezelőtt)
- Joint ATLAS - CMS Open Virtual Visit, 2024.06.11. (25 megtekintés • 1 hónappal ezelőtt)
- CMS Virtual Visit from Pakistan, 2024.06.06. (120 megtekintés • 1 hónappal ezelőtt)
- CMS Virtual Visit from Brazil, 2024.05.13. (26 megtekintés • 2 hónappal ezelőtt)
- CMS Virtual Visit from Spain, 2024.04.25. (29 megtekintés • 2 hónappal ezelőtt)
- CMS Virtual Visit from Bulgaria, 2024.04.20. (148 megtekintés • 2 hónappal ezelőtt)
- CMS Virtual Visit from ATOMKI, Hungary, 2024.04.18. (71 megtekintés • 2 hónappal ezelőtt)



Surface crew

- Have a fixed connection somewhere from an interesting place of CMS experiment:
 - Control room
 - Assembly hall at life-size CMS poster
- Equipments:
Camera, microphone computers, video mixer, light, earphones
- Guides are not required to have special accesses, instead they should be able to convene the visit and answer questions





Mobile crew

- Can go anywhere at CMS experiment site
- Equipped with mobile phone with stabilizer and earphone
- Guides must possess all access rights to the experimental cavern and should be up-to-date with the detector status



The format of the virtual visit is highly flexible

- School classes
- Events – Science festivals, fairs, European Researchers' Night
- Full online virtual visit (no school room, no venue)
- Multi experiment virtual visits (ATLAS, IceCube, LIGO)
- Multipoint virtual visits (many school / institutes connect)
- Open virtual visit to serve small groups or individuals
- Length of the visit is usually one hour, but we can accommodate to the requestor wish



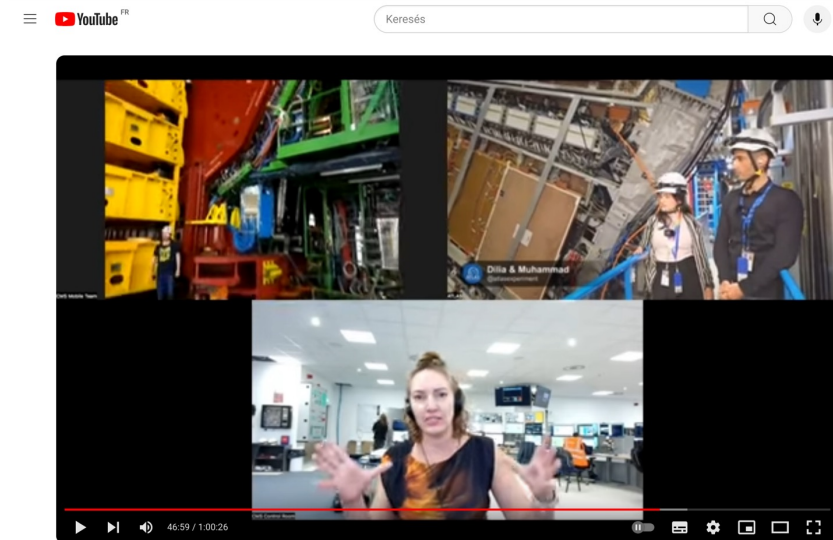
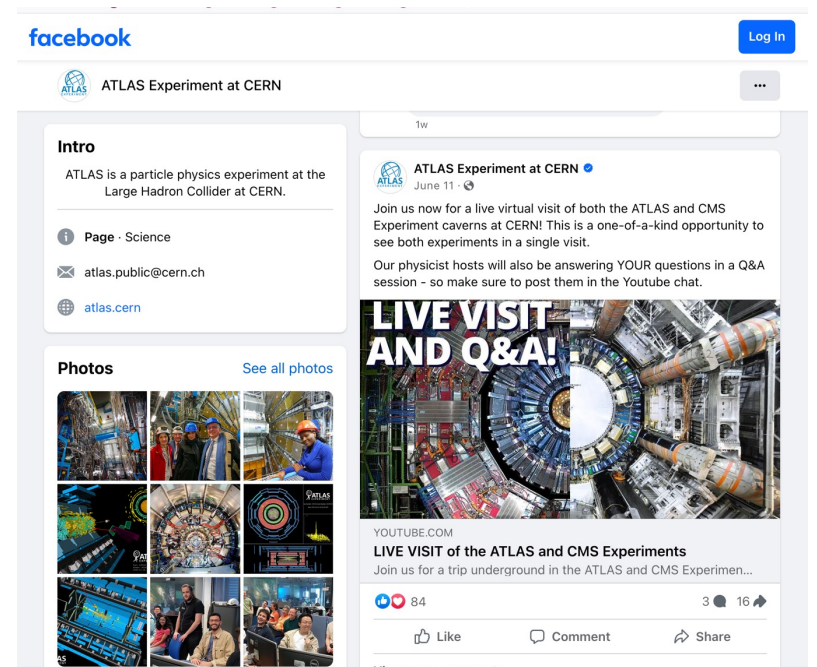
CMS - ATLAS – Ice Cube virtual visit

- Visit together with ATLAS experiment and IceCube experiment on
- Organized on 2. October 2014
- Virtual visit brings CERN and South Pole to schools:
<https://cylindricalonion.web.cern.ch/blogs/virtual-visit-brings-cern-and-south-pole-schools>

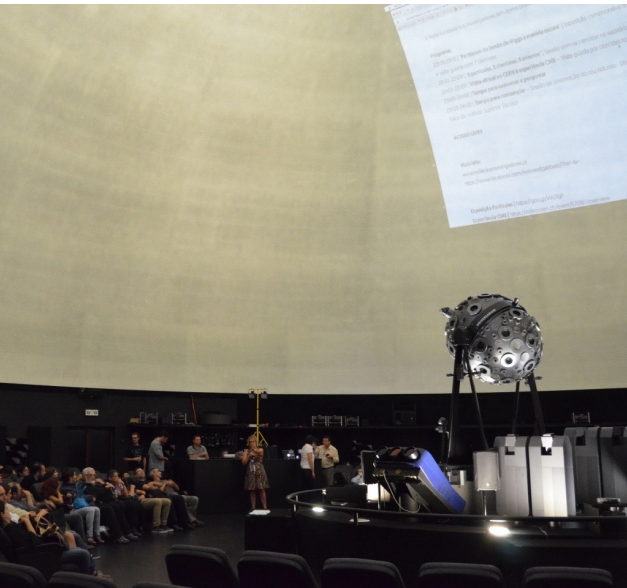


First ATLAS & CMS joint open virtual visit

- Organized on 11. June 2024
- Advertised on social media channels
- Streamed on YouTube channels of ATLAS and CMS experiment
- Questions collected from social media channels



Joint ATLAS - CMS Open Virtual Visit, 2024.06.11.

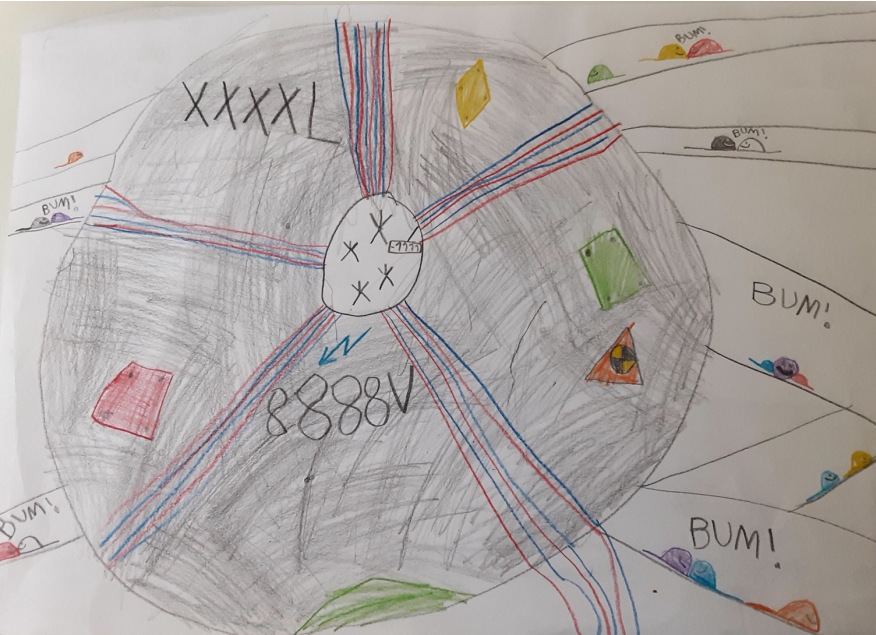


Statistics

- The number of visitors varies usually between ~20-500 people / visit depending on the geographical location and the type of the visit / event.
- We serve usually 50 virtual visit / year, which is ~3000 visitors / year
- Peak times are usually during school teaching period (february-may and october-november)

3. What insights have you gained?

I learned how scientists really are. When I think of scientists, I see labcoats, glasses, and frizzy hair. I also learned how far the scientists have gotten.



Reflection

1. What suprized me today is the fact that I didnt know the people were trying to find answer about how the universe was made. I have always thought of that when I would go to church because they would always say god created everything. And I wasn't sure if that was all frue but I hope that the "Bang Bang" could help me whith finding that answer?

Feedback

"It was amazing to see the facilities at CERN and be able to talk to scientists about their work at CERN"

"I really enjoyed the visit, and it was very cool to see something that is so talked about, and is not easily accessed by everyone. I was impressed at the size of everything, and how everything looked so huge, I can only imagine if I was there! Thank you for the visit!"

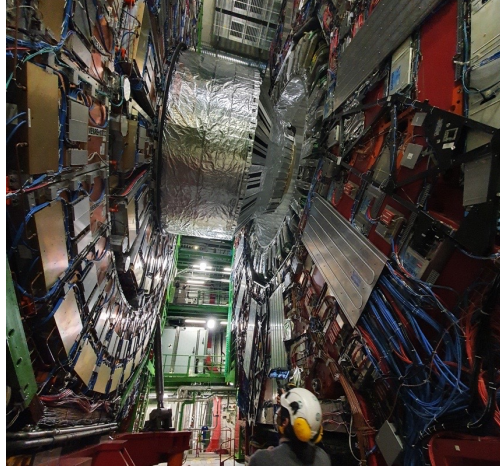
"Thanks for running the event yesterday. I'm not a scientist but followed the talk with great interest, helped enormously by the explanations from the two scientists. It raised my level of understanding of particle physics way beyond what I had previously understood."

"Thank you for the fascinating virtual tour of CERN. The guides were excellent and so lively in their delivery and I did find I understood more about the Compact Muon Solenoid as a result of this tour. I now have a slightly better understanding of what particle physics entails but there are other questions I would like to have answered and I'm wondering if there will be an opportunity to ask these."

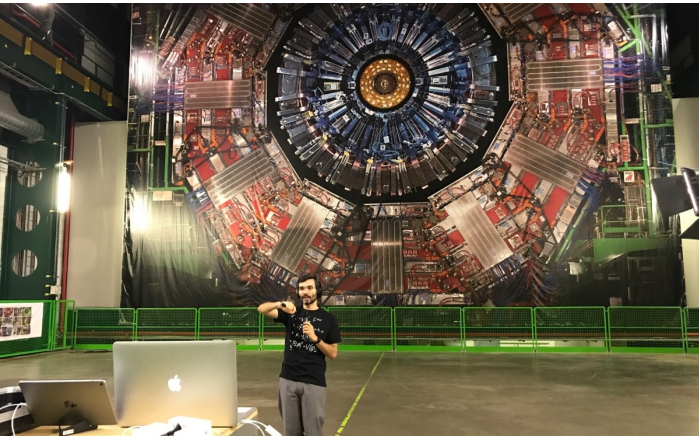
"The visit was great, super live, very interesting, everyone enjoyed it very much. I thank you for your time and your enthusiasm."

"Many thanks for a phenomenal presentation, I am still in awe of the LHC analogy that "making two protons collide is about as difficult as two people standing at either end of a football pitch throwing needles at each other & hoping they would collide head on"!"

all positive!



Plans



- The CMS outreach have a wide spectrum of complementary activities to reach the public and the virtual visit is one of them (site visit, masterclass, VR, 360, social media posts, blogs, ... etc)
- Continue to make more joint virtual visit with other experiments and other institutes
- Continue to organize open virtual visits and make them regularly



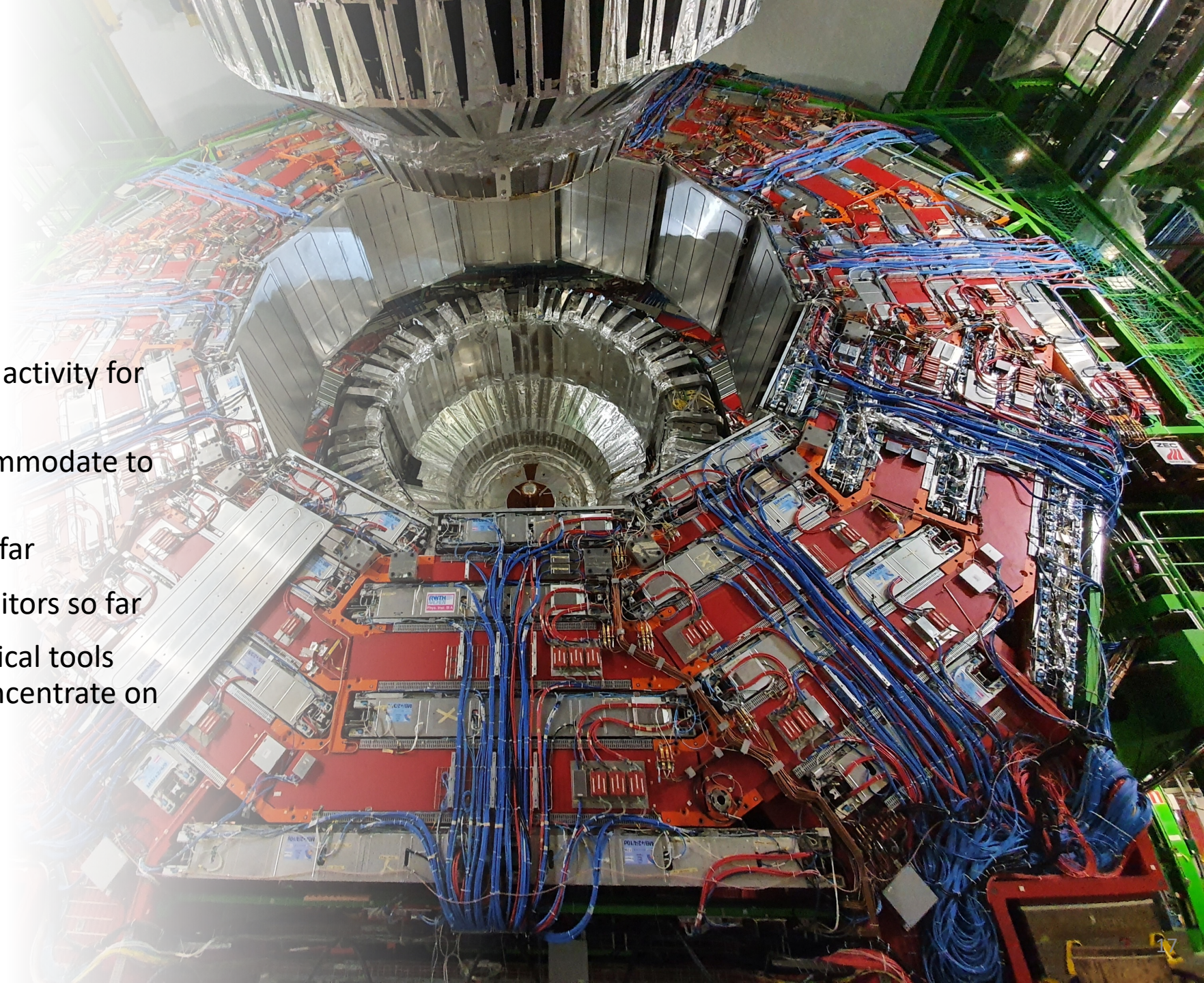
Ways in which VVs could also expand

Some of the things we are already doing and that could be relevant to others looking at starting their own virtual visits:

- Going even more bespoke by collecting questions before the visits themselves and creating targeted presentations / topics
- Send material to groups beforehand to jump start the interaction
- Lightweight versions to be rolled out with e.g. influencers

Summary

- CMS performs this outreach activity for more than a decade
- Flexible format to best accommodate to the requestors needs
- Had more than 500 visits so far
- Served more than 20 000 visitors so far
- Having a standardized technical tools that allows the guides to concentrate on the content only



Images from the requestor side



Backup

Interesting virtual visits

- A virtual visit included a special item: we sent a CMS greeting card to school located 2000 km away, using the ionosphere as a reflector.
- Article:
CQ CQ* Targovishte: CMS Virtual Visit to Bulgaria
<https://cylindricalonion.web.cern.ch/blogs/cq-cq-targovishte-cms-virtual-visit-bulgaria>



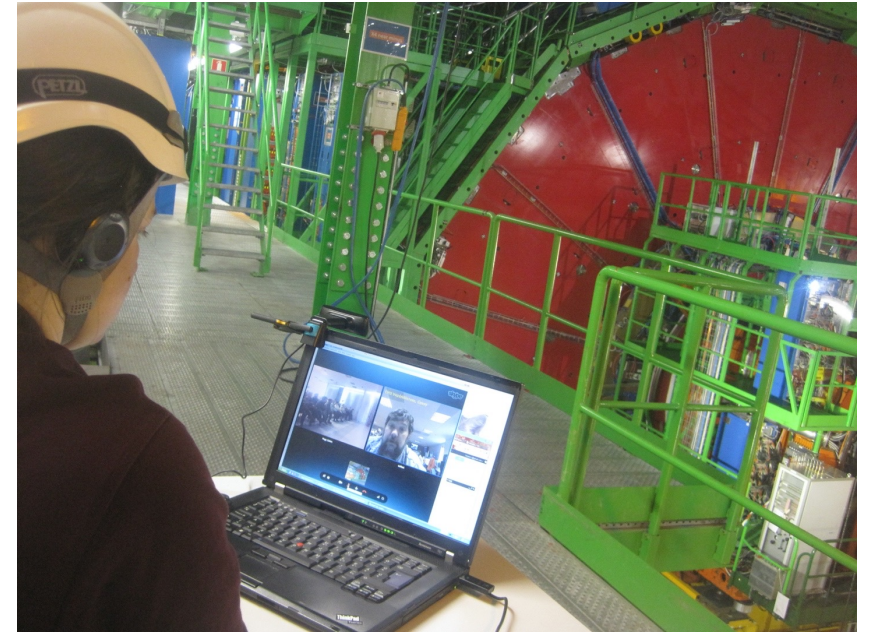


Motivation of virtual visits

- As part of the general outreach activity of CMS, virtual visits also takes part in demistification of particle physics, experiments, daily life of scientists.
- The aim is to involve the audience rather of the atmosphere of the experiment life than to teach particle physics on an interactive way.
- Live show: added value to the communication with the audience
- We try to reach the feeling that the guide is "one of us": we always try to find a guide from the requestors country / region, talking on the language of the requestor.

History of CMS virtual visit

- The first visit was 10. November 2011, which is based on the request from a teacher of a Hungarian school in Budapest, which was not able to afford to come to CERN physically.
- Beyond a certain distance from CERN it might be economically infeasible to visit physically CERN. With virtual visits different venues can be served, too.
- Idea came: Standardize the format, equipment. Have a back office who keeps contact with requestor. Create resource material for the requestor for example a poster for the event.
The equipment is handled by trained experts → the guide can focus on the visit.
- The first official CMS virtual visit with standardized equipment and back office was on 26. September 2014 European Researchers' Night - Italy – Parma.



Articles

- Local TV about the virtual visit at School Öveges:
https://civiltv11.blog.hu/2011/11/14/hadronutkozto_az_ovegesben
- How did the Virtual Visit project start at CMS? - <https://cylindricalonion.web.cern.ch/blogs/how-did-virtual-visit-project-start-cms>
- CMS now open for Virtual Visits <https://home.cern/fr/node/4550>
- Visit CMS through the Power of the Internet <https://cylindricalonion.web.cern.ch/blogs/visit-cms-through-power-internet>
- Visit CMS through the Power of the Internet <https://cylindricalonion.web.cern.ch/blogs/cms-open-virtual-visits-your-school-science-festival-or-exhibition-centre>