



CMS Virtual Visits: engaging audiences worldwide into conversation about cutting edge science

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On behalf of the CMS Collaboration

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Virtual Visits (VVs) allow the **general public** to visit **CERN** virtually and have live conversations with **scientists** in their **native language**

The **technical requirements** for a **VV** are:

- ✧ **A computer** with a **network speed** of minimum **1 Mbps**
- ✧ **Video projector** and a **dim room**
- ✧ **Microphone** and **noise cancelation unit**
- ✧ **Vidyo/Skype/Zoom/etc.** (test compulsory)

- ❖ During the **VV** at **CERN**, there are preferably **2 scientists** (one on the surface and another with the detector) + 1 or **2 more** in charge of the technical transmission (video, sound, recording, etc.)
- ❖ At the **venue** there is at least **1 scientist** or **coordinator** in charge. It is advised that the coordinator gives an introduction of the **CMS Experiment** before the VV starts

*** VVs are recorded and kept on a permanent site for future reference**
Feedback is collected at the end of the event to allow for improvement

Audiences are mainly **students, teachers** and the **general public**. A **virtual visit** is a unique opportunity to **explore the site detector live** with **scientists** from around the world acting as guides

An Iranian scientist guiding a CMS Virtual Visit from **Iran**



Remote audience (university students) from **Mexico** during a CMS Virtual Visit



Using a **web-based videoconference**, CMS scientists **interact** with visitors in their **preferred language**, explain the **physics** and **technology** behind the experiment, and **answer** their **questions**

Mexican and Colombian scientists guiding a Researchers' Night CMS virtual visit

A visit to the CMS detector cavern



Outreach activities aim at **inspiring young people** to ask questions and get involved in science

Students in different events related to High Energy Physics in **Mexico**



Some comments expressed by high school students in Mexico after a virtual visit

Ali: The **Virtual Visit was like right out of the movies!** Kind of “Angels and Demons”! It made me realize that physics goes far beyond Newton and now I am much more curious to understand more about physics!

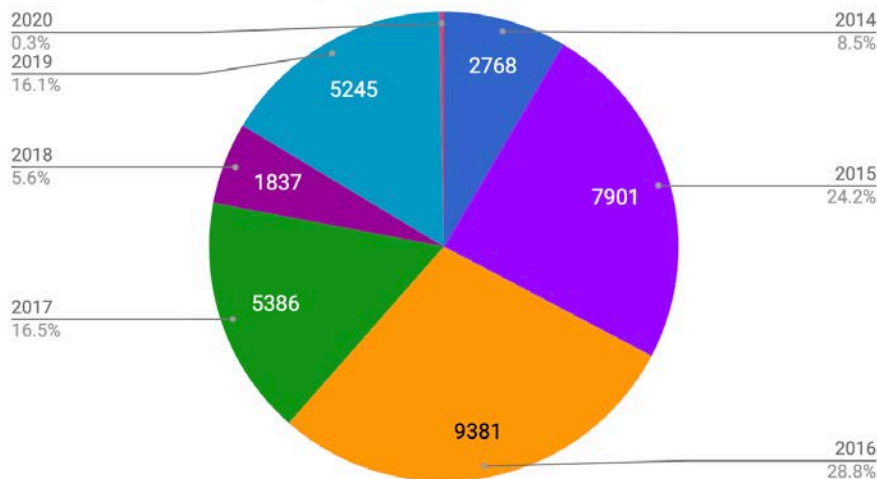
Linda: It was very interesting, **they showed us that physics is not just what we learn in class** but that it has many other applications in areas such as medicine, engineering and practically all the technology that we use! I really liked the connection with medicine as I want to pursue a career in the health sector!

Jorge: It was very cool **to be transported to a different location in the world** without leaving our school and to realize that there are so many varied and important technologies which we can have access to!

VV participants per year & month

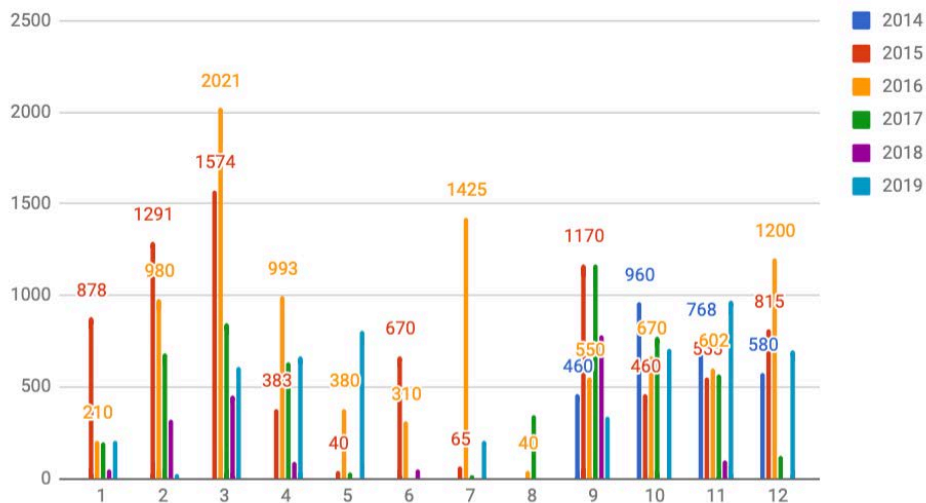
2014	2768
2015	7901
2016	9381
2017	5386
2018	1837
2019	5245
2020	100
Grand Total	32618

Number of participants per year



	2014	2015	2016	2017	2018	2019
1		878	210	195	50	210
2		1291	980	681	320	25
3		1574	2021	850	450	609
4		383	993	630	90	670
5		40	380	30	0	803
6		670	310		47	
7		65	1425	20	0	210
8			40	350	0	
9	460	1170	550	1170	780	340
10	960	460	670	770	0	710
11	768	555	602	570	100	968
12	580	815	1200	120		700

Visitors per month

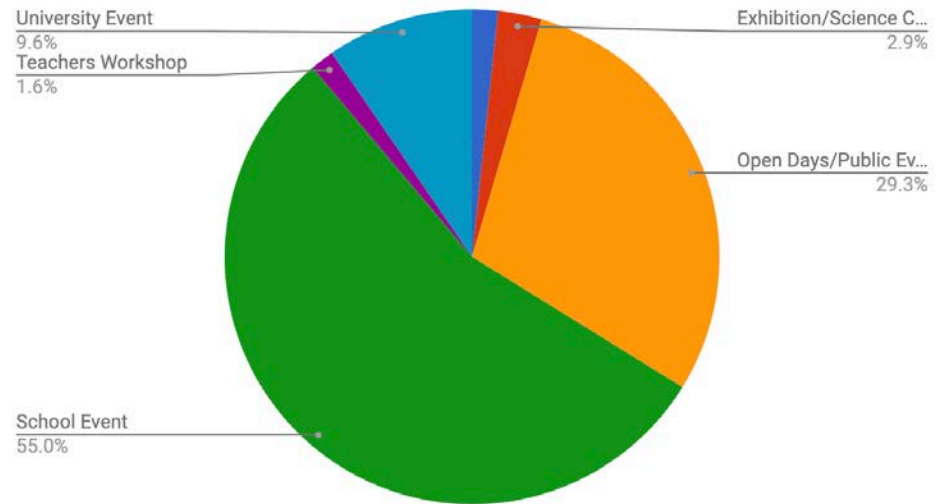


Main reasons for a VV& type of audiences

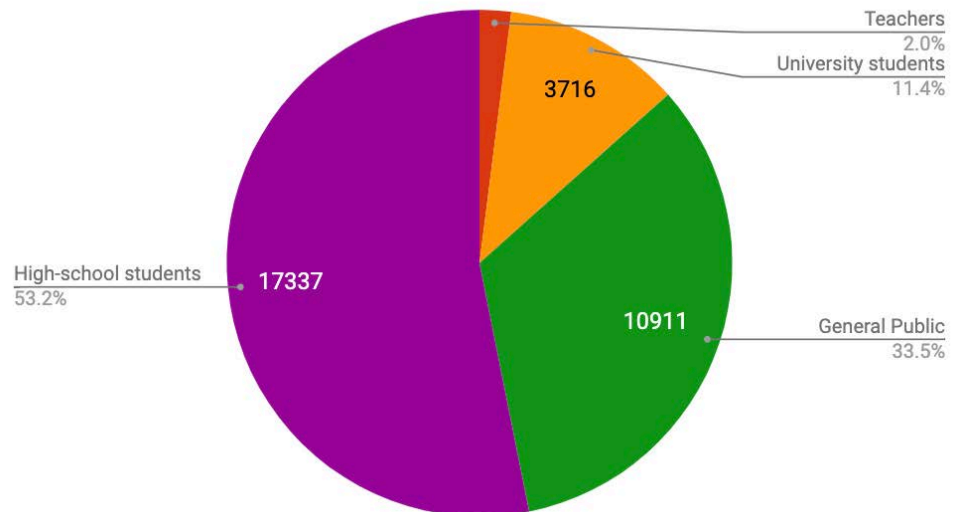
Conference	545
Exhibition/Science Centre	926
Open Days/Public Event	9509
School Event	17856
Teachers Workshop	509
University Event	3113

Teachers	654
University students	3716
General Public	10911
High-school students	17337
Grand Total	32618

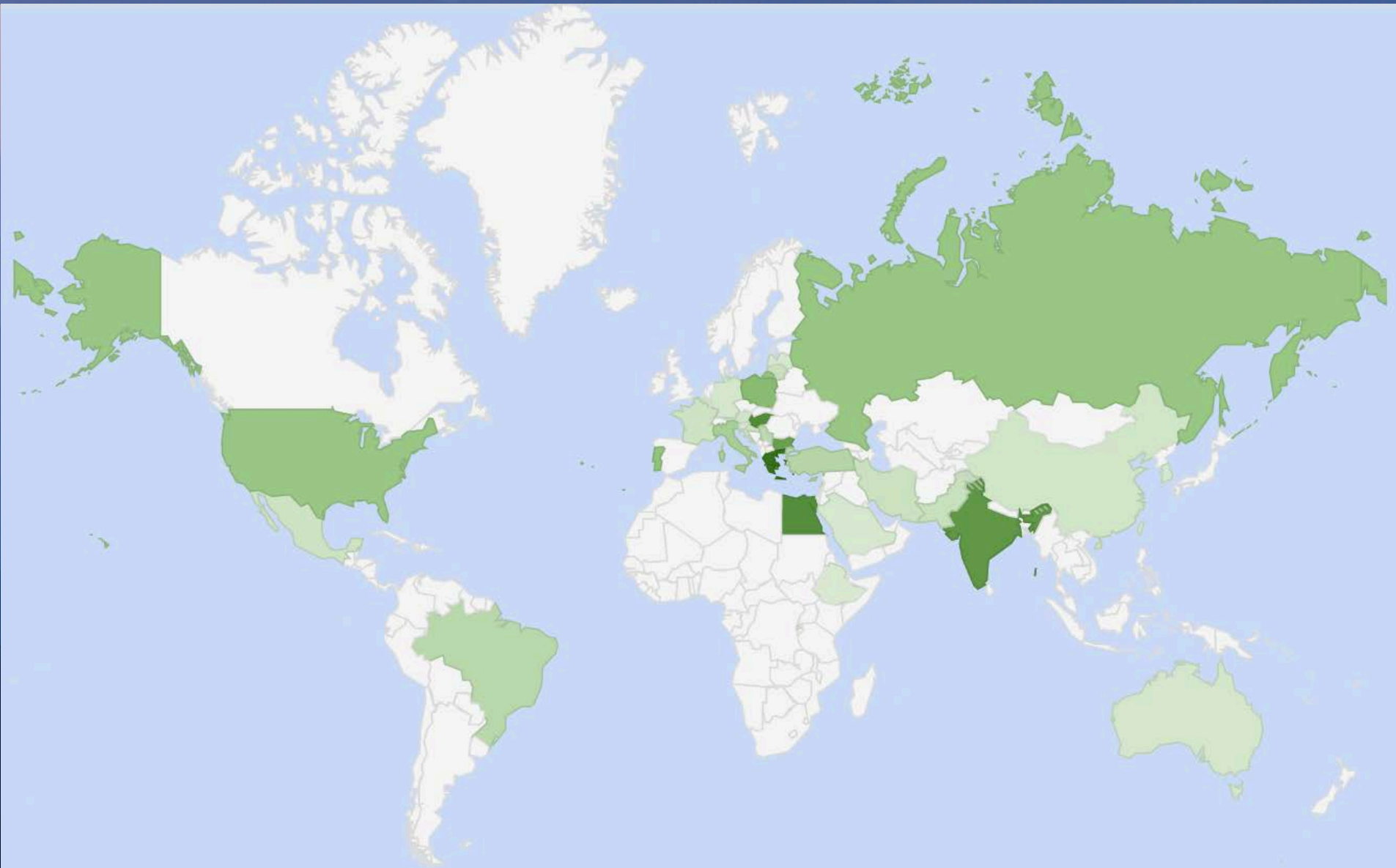
Main reasons for a CMS virtual visit



Type of audience

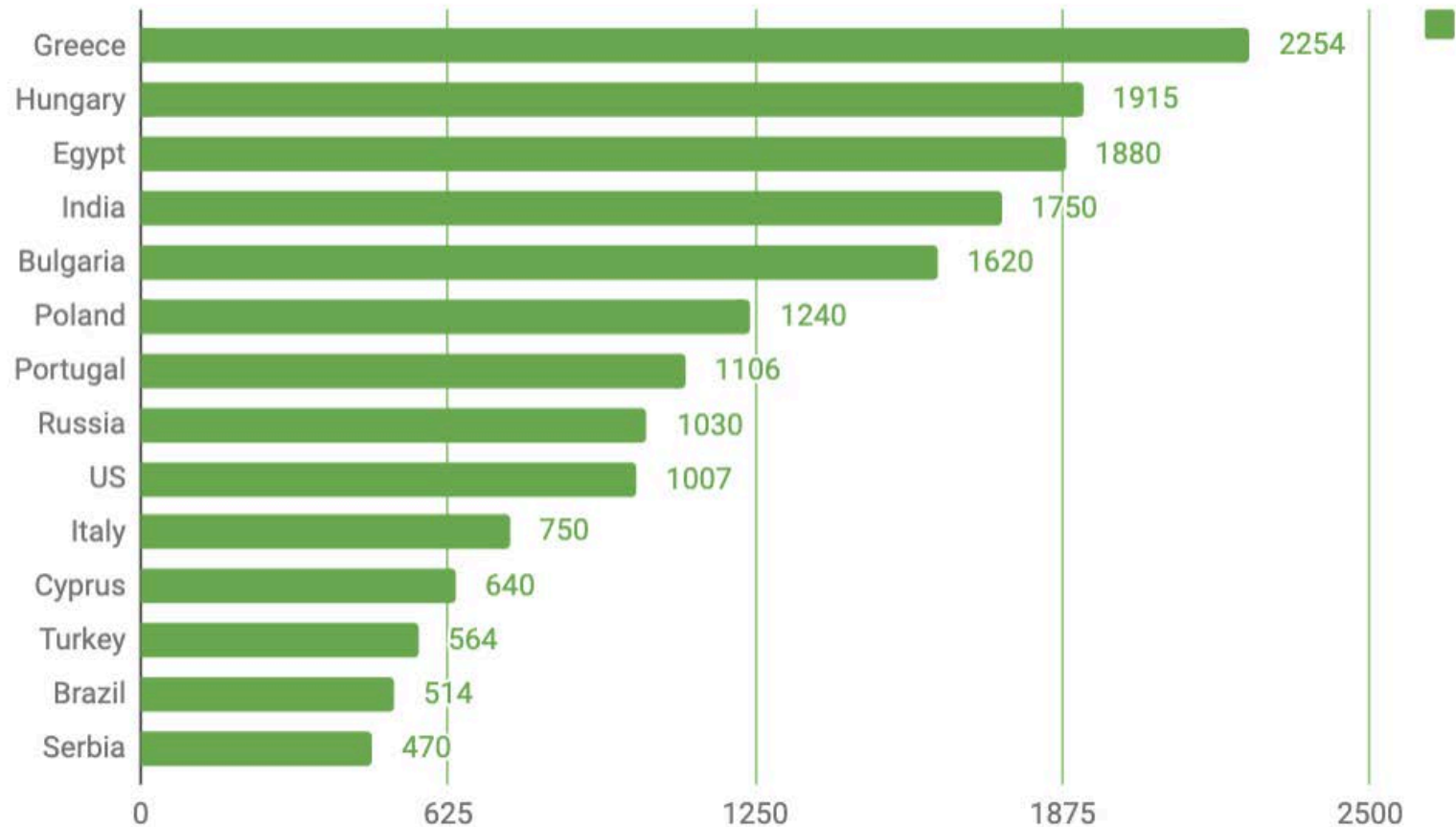


Map of countries participating in VVs



Top 14 countries participating in VVs

Top 14 countries



Partnerships

Having **international partnerships** helps to **reach out** to more **students and the general public** around the world making frontier science available to a wider audience

Example: A partnership between International Masterclasses, QuarkNet and the International Particle Physics Outreach Group (IPPOG) implemented **the first large totally online Masterclass** called **BAMC (Big Analysis of Muons in CMS)**, during the week of the 13th of April 2020. This event was a big success with the participation of:

- ✧ 23 international schools
- ✧ 4 countries (China, Mexico, UK, USA)
- ✧ Over 230 students analyzed 11,633 CMS events in ~ 2 days
- ✧ ~180 students and teachers attended a webinar to discuss results and a CMS lecture during that week

*The interest in April was such that a similar event was organized in May with 460 students worldwide analyzing 23,541 events.

New Challenges

The COVID-19 pandemic has forced society around the world to confront new challenges, including how to teach and share knowledge with students

Events such as BAMC may help educators to deal with this new reality and inspire students to persevere acquiring knowledge

BAMC was designed for students and teachers working online. A simplified CMS masterclass analysis was planned with online support from teachers and CMS physicists so students could do the measurements from home

Another example

CMS scientists have joined forces during this pandemic to keep **students active**, organizing webinars to talk about HEP

On June 12th 2020 the Universities of Puebla (BUAP) and Sonora (UNISON) in Mexico –CMS collaborators- organized the webinar “The Physics of Elementary Particles” covering topics from LHC experiments to artificial intelligence and quantum computing. Around 130 people attended the webinar

The students expressed a lot of enthusiasm and appreciation for the organization of this kind of event and were eager for more

We need your enthusiasm! Get involved!

As a Coordinator:

- ✧ Bring a **VV** to a local school
- ✧ Talk to your IPPOG representative to get help in coordinating the **VV** to include several schools in your country
- ✧ Integrate a **VV** as part of the school's events related to science and education

As a Guide:

- ✧ If at CERN join the **team of guides**



CMS Virtual Visits information

Website:

<http://cms.cern/interact-with-cms/virtual-visits>

Contact:

cms.outreach@cern.ch

Photos:

<http://cern.ch/go/lv8V>

Acknowledgements

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- ✧ **The CMS Outreach Group** for helping to organize the **Virtual Visits** and for collecting the statistical data related to them
- ✧ **Marzena Lapka** for providing much of the necessary information and material for the preparation of this talk
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Thank you for your attention!