

# INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS

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SG meeting, Lisbon  
20.04.2017



# International Masterclasses 2017



1.3. - 11.4.2017  
50 countries involved



Coord.: QuarkNet / TU Dresden



- 43 institutes (43)
- 50 Masterclasses (48)
  - 35 CMS (33)
  - 15 ATLAS (15)



- 173 institutes (169)
- 264 Masterclasses (227)
  - 45 ATLAS W (42)
  - 93 ATLAS Z (83)
  - 52 CMS (49)
  - 45 LHCb (34)
  - 24 ALICE SP (15)
  - 5 ALICE R\_AA (4)

# New participants

## Russia

- St. Petersburg (ALICE)
- St. Petersburg, Moscow (LHCb)

## Georgia

- Tbilisi (CMS, ATLAS); Ken + Uta greeted on video

## Bangladesh

- Dhaka (ALICE); planned to participate also on UN Girls day, but had to cancel

## Philippines

- German European School Manila (CMS, ATLAS)

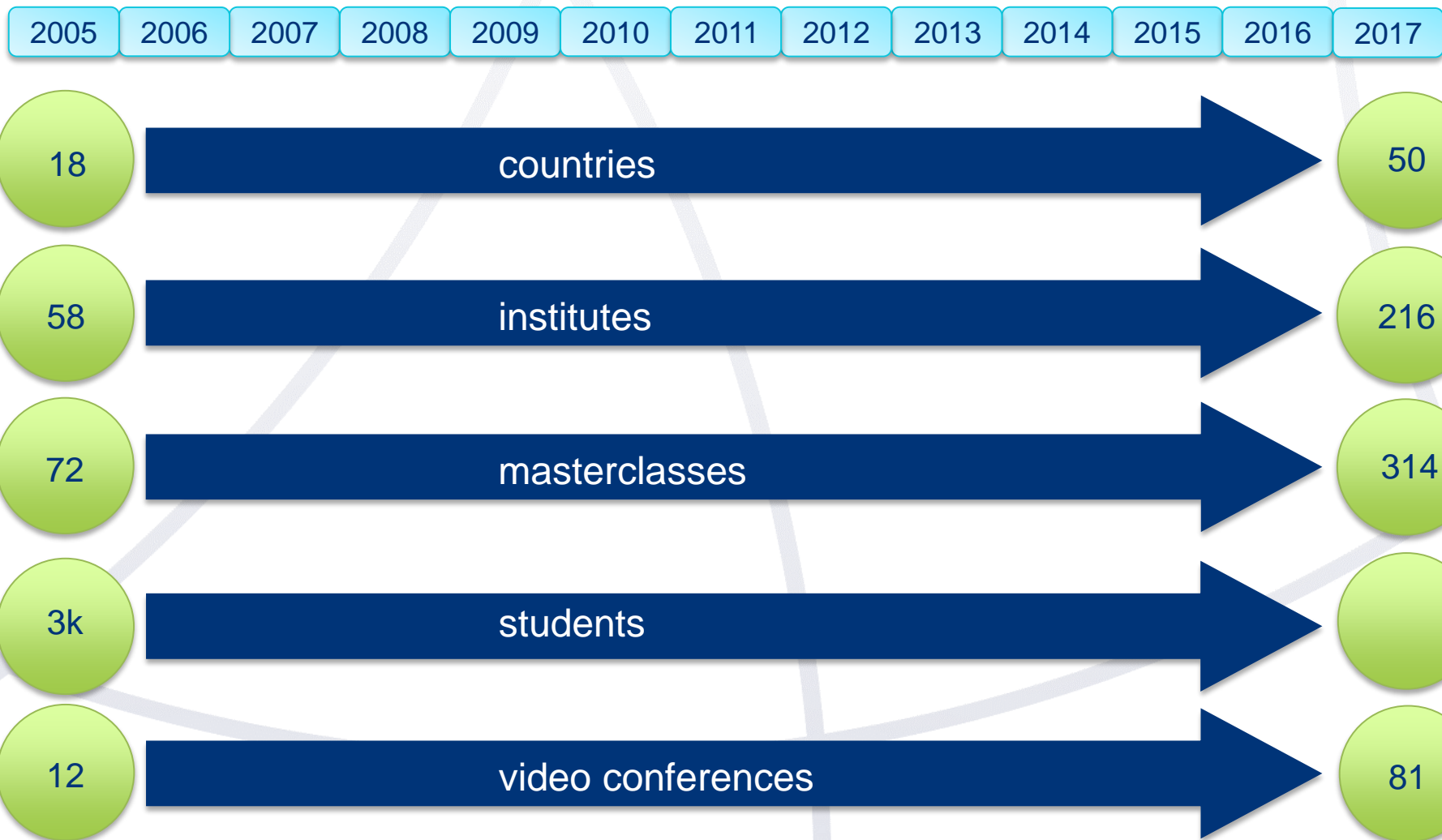
## Montenegro

- Podgorica (CMS)

## (Rwanda)

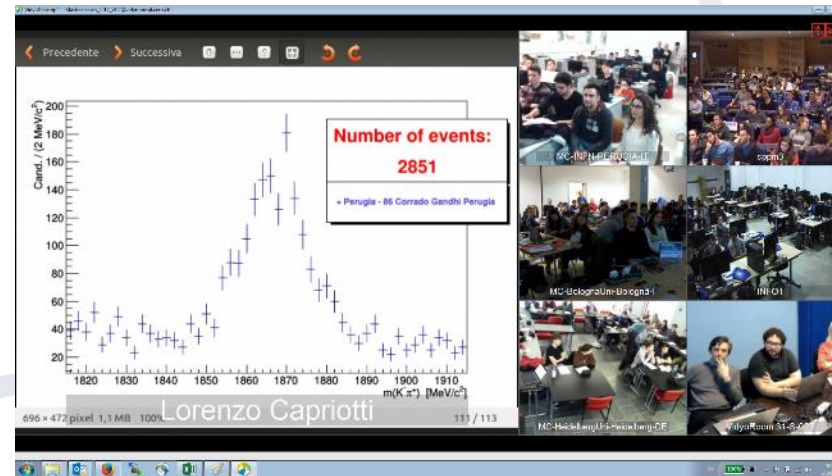
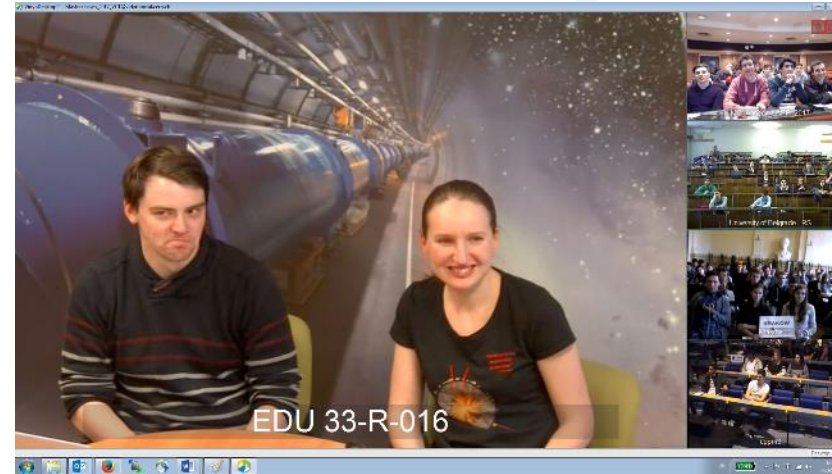
- Kigali planned to participate, but had to cancel

# Statistics International Masterclasses



# Videoconference

- 57 videoconf. with CERN (54), 62 moderators
- 24 with Fermilab (21), 20 moderators
- 1 with TRIUMF (1)
  
- Call for moderators at CERN was extremely successful
- New concept will be discussed later ...



# Some key factors for success

- Preparing institutes
  - (bi)weekly circulars [http://physicsmasterclasses.org/index.php?cat=local\\_organisation&page=organisation](http://physicsmasterclasses.org/index.php?cat=local_organisation&page=organisation)
  - Orientation for Fermilab institutes
  - Targetted emails for changes in the measurements
  - Question time
  - Manual for videoconference  
[http://www.physicsmasterclasses.org/downloads/manual\\_local\\_organizers\\_2017\\_02\\_16.pdf](http://www.physicsmasterclasses.org/downloads/manual_local_organizers_2017_02_16.pdf)
- WG videoconference (M. Hauschild, K. Leney, Marzena, Kate, Uta)
  - Training for moderators (2 h) <https://indico.cern.ch/event/611625/>
  - twiki, manual (restricted access, due to password exposure)
  - new quiz
  - Rooms at CERN
- Vidyo team / Marek Domaracky + videoconference team at Fermilab
  - Rooms in 600 and 31
  - Vidyo support
- Maureen
  - Room 33-R-16
  - Shirts for moderators (31)

# Outcomes

- 4 video conferences recorded
  - ATLAS W (Stefanie M., Marcus) <https://indico.cern.ch/event/630550/>
  - CMS (Maria, Andreas) <https://indico.cern.ch/event/630553/>
  - ALICE S.P. (Ina, Despina) <https://indico.cern.ch/event/630826/>
  - ATLAS Z (Clara, Chris) <https://indico.cern.ch/event/631727/>
- Photos
  - [http://www.physicsmasterclasses.org/index.php?cat=archive&page=photos\\_2017](http://www.physicsmasterclasses.org/index.php?cat=archive&page=photos_2017)
- Media coverage
  - <http://www.physicsmasterclasses.org/index.php?cat=press>

# Social media

- account [@physicsIMC](https://twitter.com/physicsIMC)
- #LHCIMC17
- Help from Clara Nellist
- Ken, Nicolas, Kate, Uta
- Schedule Nov-April
  
- 242 tweets
- 389 followers

2016:



physicsIMC  
@physicsIMC

TWEETS	FOLLOWING	FOLLOWERS
79	100	202

2017:



TWEETS: 242 FOLLOWING: 238 FOLLOWERS: 397 LIKES: 41 MOMENTS: 0

Tweets Tweets & replies Media

physicsIMC @physicsIMC · Apr 4  
Dubrovnik, Manila, Ozyegin, Split, Tbilisi crunched over 7500 @CMSexperiment events, learned about leptons and W's.

Sum	e/mu	W+W-
7543	1.02	1.27

Who to follow - F

- Dr. Chand Followed by
- Bjoern Pe Followed by and others



# Twitter impressions

FEB 2017 SUMMARY	
Tweets	Tweet impressions
3	9,924
Profile visits	Mentions
611	4
New followers	
17	

**Feb 2017** · 28 days

TWEET HIGHLIGHTS

**Top Tweet** earned 4,026 impressions

Great Masterclass wit [@ATLAS](#) data at [@\\_IFAE](#) in Barcelona!  
[pic.twitter.com/wQoczcOWpb](http://pic.twitter.com/wQoczcOWpb)

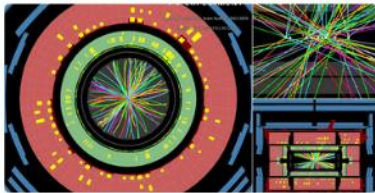


👍 2 ❤️ 19

[View Tweet activity](#) [View all Tweet activity](#)

**Top media Tweet** earned 6,664 impressions

Today high school students at [#CPPM](#) [#Marseille](#), IFJ Krakow, [#LAPP](#) [#Annecy](#), and Belgrade analyze data from [@ATLASexperiment](#) in [#LHCIMC17](#)  
[pic.twitter.com/tfTbB0vQGc](http://pic.twitter.com/tfTbB0vQGc)



👍 11 ❤️ 26

[View Tweet activity](#) [View all Tweet activity](#)

MAR 2017 SUMMARY	
Tweets	Tweet impressions
42	29.6K
Profile visits	Mentions
2,081	91
New followers	
61	

**Top mention** earned 109 engagements

**IFAE**  
[@\\_IFAE](#) · Feb 10

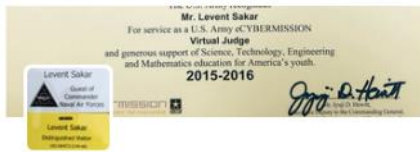
Searching for the Higgs Boson in the [@WomenScienceDay](#) [@physicsIMC](#) [#LHCIMC17](#) [#Zpath](#) girlsinscience.iafe.es [@ATLASexperiment](#)  
[pic.twitter.com/0IDfjpJMfr](http://pic.twitter.com/0IDfjpJMfr)



👍 9 ❤️ 16

[View Tweet](#)

**Top Follower** followed by 41.8K people




**Levent Sakar, M.Ed.**  
[@leventsakar](#) [FOLLOWS YOU](#)

[#Physics](#) teacher and curriculum writer. Developer of [@STEMSOS](#) (student on the stage) [#PBL](#) Model. Leadership awardee in [#STEM](#). [@NIMITZNEWS](#) Distinguished Visitor

[View profile](#) [View followers dashboard](#)

**Top mention** earned 8 engagements

Masterclass organizers: Use the logo of [@physicsIMC](#) from [tinyurl.com/gvn2aba](http://tinyurl.com/gvn2aba) and design your own flyer/invitation letter/banner/shirt/..  
[pic.twitter.com/UZQ5hHQE3n](http://pic.twitter.com/UZQ5hHQE3n)



**INTERNATIONAL MASTERCLASSES**  
 hands on particle physics

👍 1 ❤️ 2

[View Tweet activity](#) [View all Tweet activity](#)

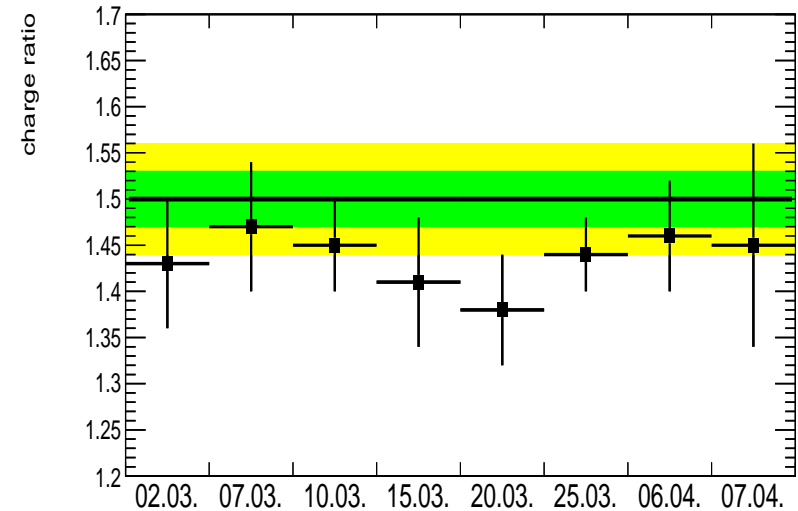
# Discussion

# ZPATH

- What worked
  - The Zpath „infrastructure“ has been stable
    - Support outside Norway limited to giving passwords and other technicalities
    - 2 very succesful events in Oslo, students enthusiastic, ...
    - People, among others, appreciated the evolution of the path. For example, the 2 photon excess end of 2015 that was brought up in 2016 was succesfully explained as a statistical fluctuation. They understand better the statistical nature of what we do!
- Can be improved
  - Some event display features
    - Autmomatism, ..., sometimes found heavy,
    - Some „bugs“ especially with muons,
  - Improvement in view / pipeline
    - Plotting and analysis tool ...
    - A survey showed that the „top“ is currently Dark Matter, so better bring it in in 2017
- Z-path is now a funded project 180 kEuros in 3 years ...

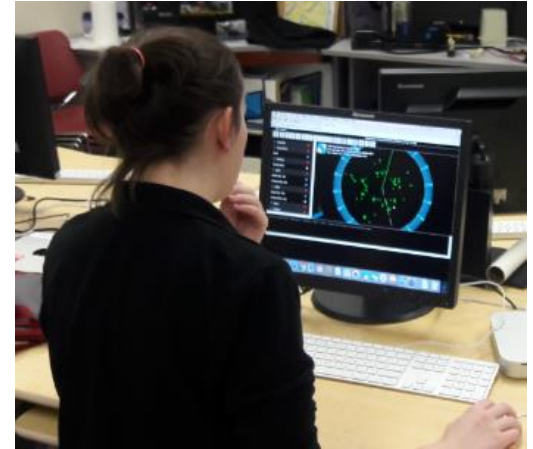
# ATLAS W path

- What worked:
  - 8 days with 37 masterclasses
  - Measured values for charge ratio:
- Can be improved:
  - Remove event number from spreadsheet of results (confusing and time consuming)
  - Show jet objects in event display?
- Only very few technical problems => all could be solved
  - In most cases wrong configuration file was loaded
  - Problems with spreadsheet of results in Safari (other browsers work fine)



# CMS WZH

- Worked
  - A. iSpy-WebGL (New tool – Choose leptons.)
  - B. Data (10K events)
  - C. CIMA (Updated to accommodate A and B)
  - D. Organization
- Need feedback: How did they work?
  - A–D above
  - How to improve awareness of characteristics; e.g., mass histogram is not created automatically.
  - Explore ways to integrate iSpy and CIMA.
  - More data; new departures
- Other comments?
- Overall – great success



# LHCb

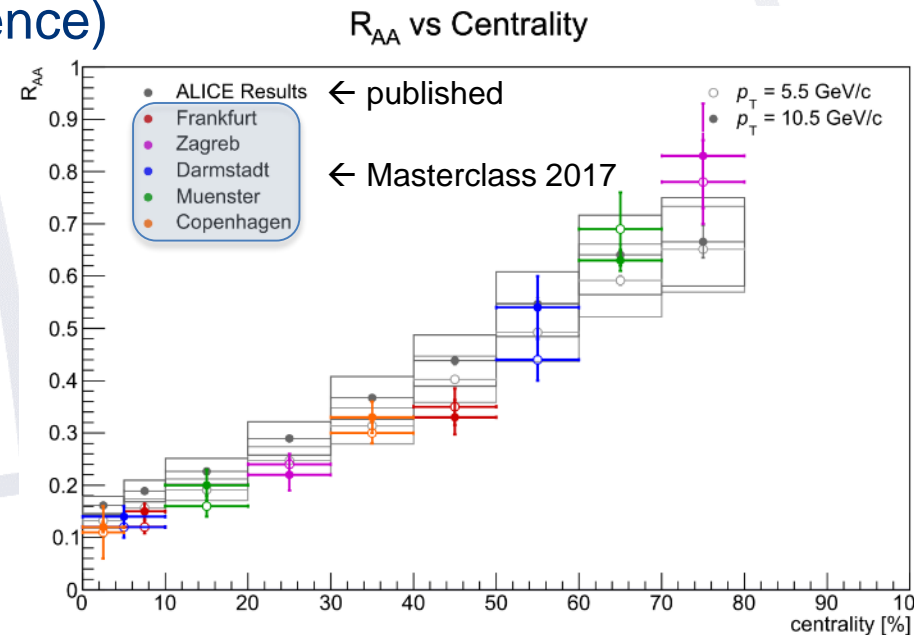
- We have changed the layout of the connection with CERN once again
  - Final quiz will not be carried out if questions keep coming up from the students
- 16:00 - *Hello to every institute - ice breaking.*
- 16:10 - *Each group communicates the value they have measured for D0 lifetime*
- 16:20 - *Comment on results from CERN*
- 16:30 - *Underground moderator reveals its presence. Presentation and questions from the institutes*
- 16:50 - *(Quiz) if needed*
- We still had problem with Vidyo, this is our bottleneck (!)
- Great feedback from newcomers (China, Russia, etc...)
- A lot to do for the future
  - Test institute to institute questions
  - Implement a new exercise in the Masterclass software

# ALICE : Looking for strange particles

- What worked
  - Exercise is stable (has not been changed after 2014)
  - Google docs for collection and presentation of results : prepared by Guillaume Batigne, very clear for institutes and moderators
  - Virtual machine used for windows systems
- Can be improved
  - A number of (known) issues pointed out by first-time participant
  - Some problems depending on ROOT version, linux system, virtual box installation etc.. : eventually solved
  - Request : to have windows version
  - Ideal : browser based analysis package : start from scratch
  - If Memorandum of Understanding signed : in kind contribution would mean putting manpower to development of masterclasse package

# ALICE – Nuclear modification factor $R_{AA}$

- One Masterclass event with 5 institutes participating
- What worked
  - measurement is stable
  - simplified version of „large scale analysis“ established („copy & paste“ of analysis code instead of actual coding)
    - also pupils with zero programming experience produce a result!
  - all institutes could contribute to the final result (produced on the spot by moderators of video conference)
- Can be improved
  - add more data (maybe from p-Pb collisions)
  - add particle identification?
- Under development / being tested
  - new measurement:  $J/\psi$  production in heavy-ion collisions





# Discussion