

INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS

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Ken Cecire, QuarkNet

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)

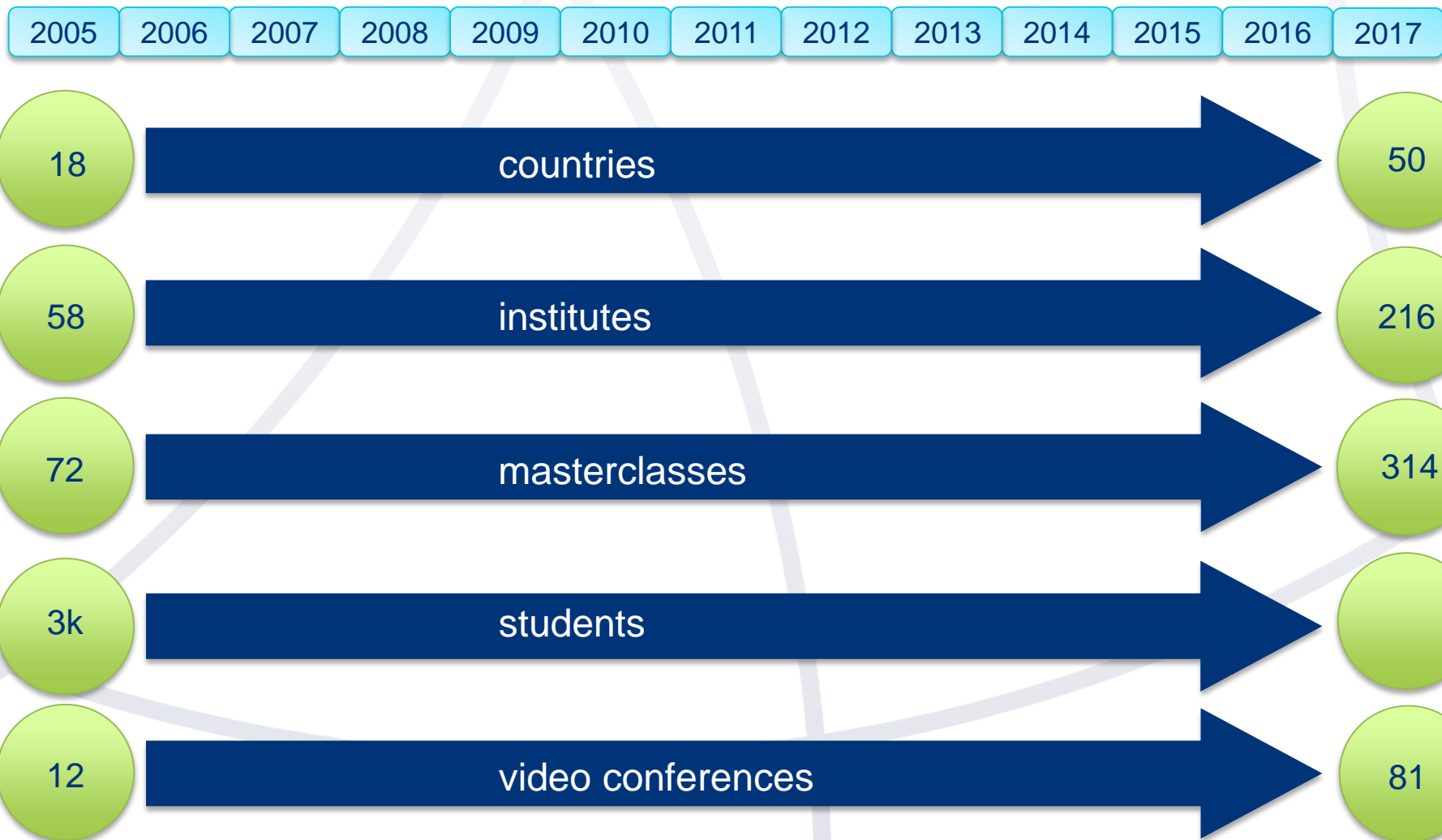
Montenegro

- Podgorica (CMS)

(Rwanda)

- Kigali planned to participate, but had to cancel

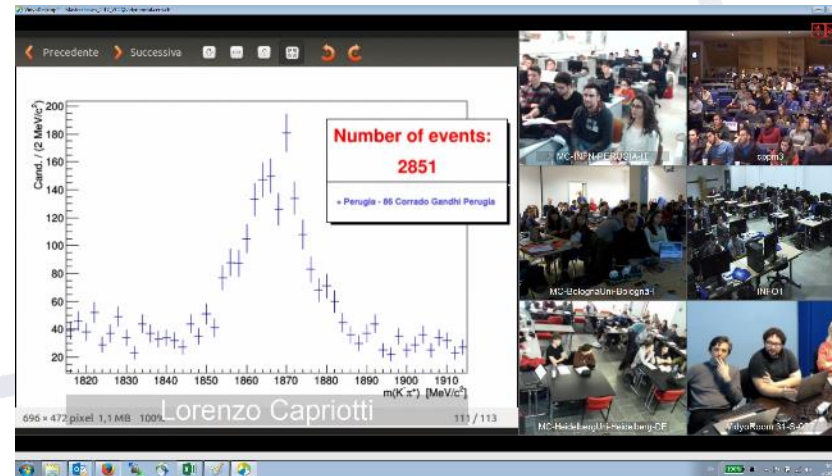
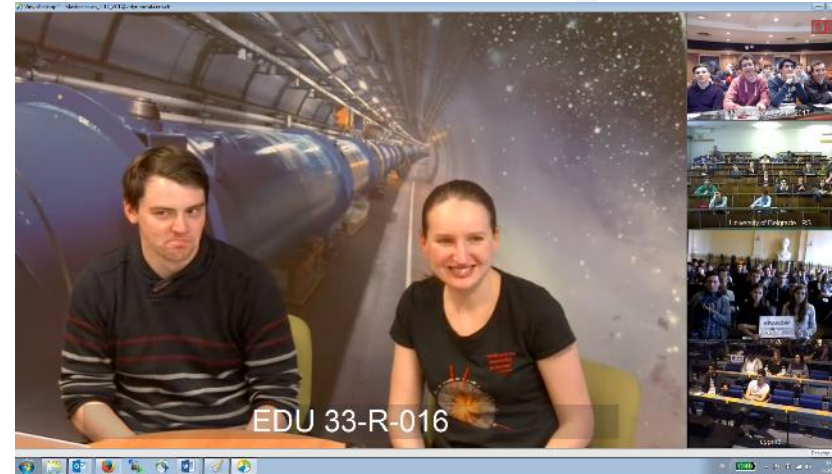
Statistics International Masterclasses



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
 - 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
- 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
- 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 · 28 days

TWEET HIGHLIGHTS

Top Tweet earned 4,026 impressions

Great Masterclass wit [@ATLAS](#) data at [@_IFAE](#) in Barcelona!
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



👍 11 ❤️ 26

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

FEB 2017 SUMMARY

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

MAR 2017 SUMMARY

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

Top mention earned 109 engagements

IFAE
[@_IFAE](#) · Feb 10

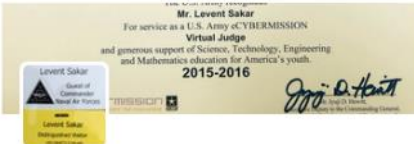
Searching for the Higgs Boson in the [@WomenScienceDay](#) [@physicsIMC](#) [#LHCIMC17](#) [#Zpath](#) girlsinscience.iafe.es [@ATLASexperiment](#)
pic.twitter.com/0IDfjpJMfr



👍 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 and design your own flyer/invitation letter/banner/shirt/..
pic.twitter.com/UZQ5hHQE3n



INTERNATIONAL MASTERCLASSES
 hands on particle physics

👍 1 ❤️ 2

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

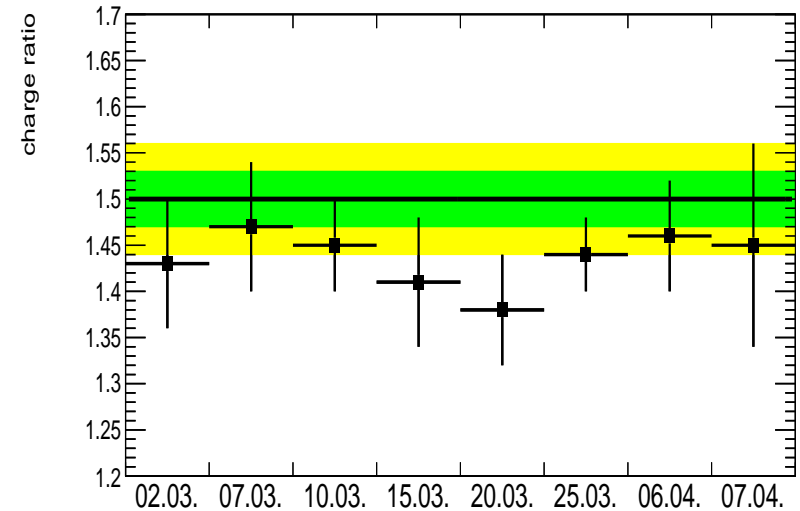
Discussion

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 ...

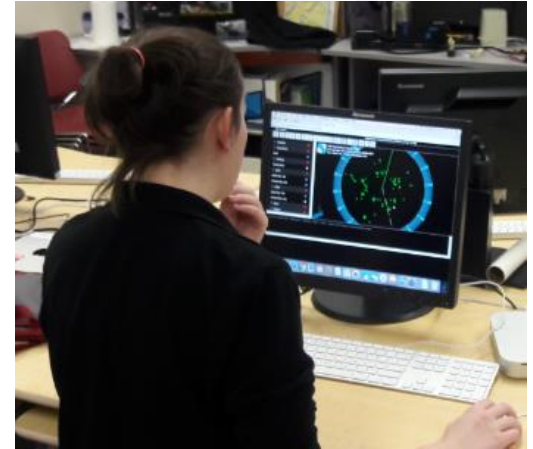
ATLAS W path

- 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

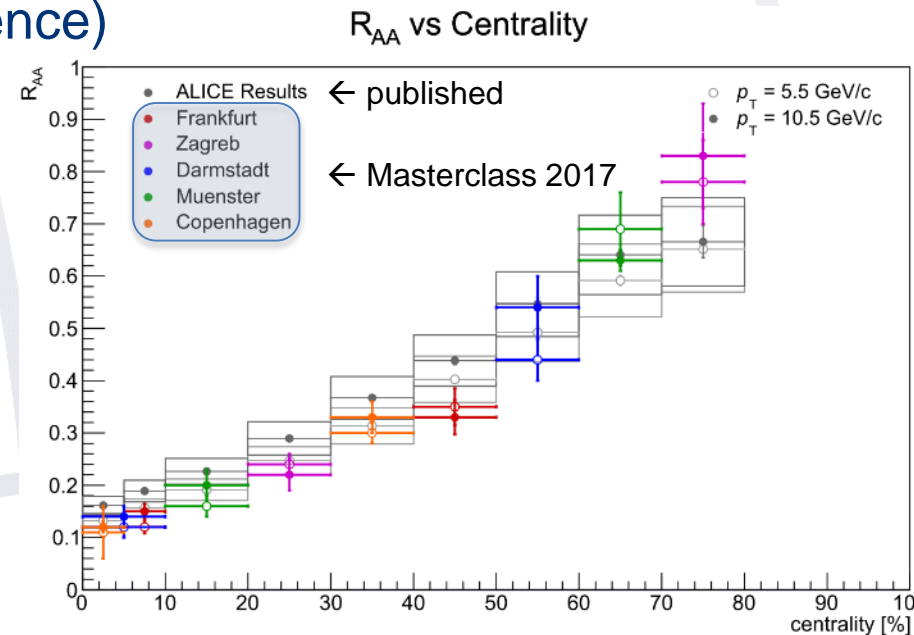
- We have changed the layout of the connection with CERN once again
 - Final quiz will not be carried out if questions keep coming up from the students
- 16:00 - *Hello to every institute - ice breaking.*
- 16:10 - *Each group communicates the value they have measured for D0 lifetime*
- 16:20 - *Comment 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/ψ production in heavy-ion collisions



Discussion