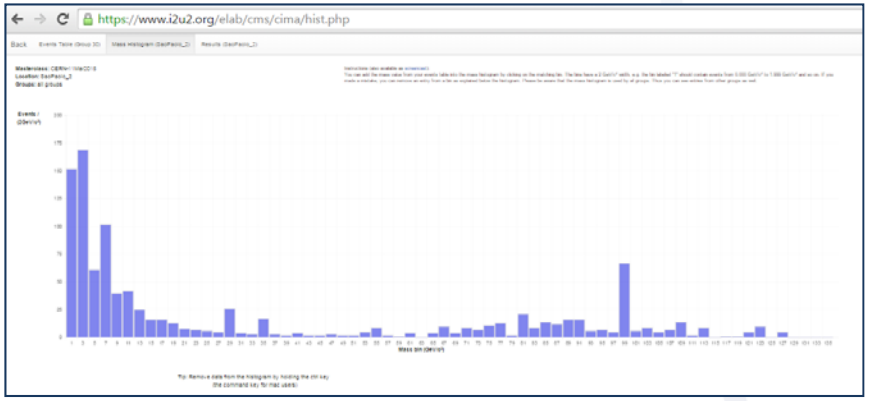
ALICE: Nuclear Modification Factor

- one session on March 13
  - ~80 participants at 4 institutes
    - Darmstadt, Germany
    - Frankfurt, Germany
    - Münster, Germany (new this year)
    - Prague, Czech Republic
- same measurement as in previous years: http://www-alice.gsi.de/masterclass/
- all groups ‘discovered’ the quark-gluon plasma
- positive feedback from all groups and moderators of the video conference

CMS Masterclass 2015

23 countries, 78 institutes



Introduced CIMA - CMS Instrument for Masterclass Analysis:

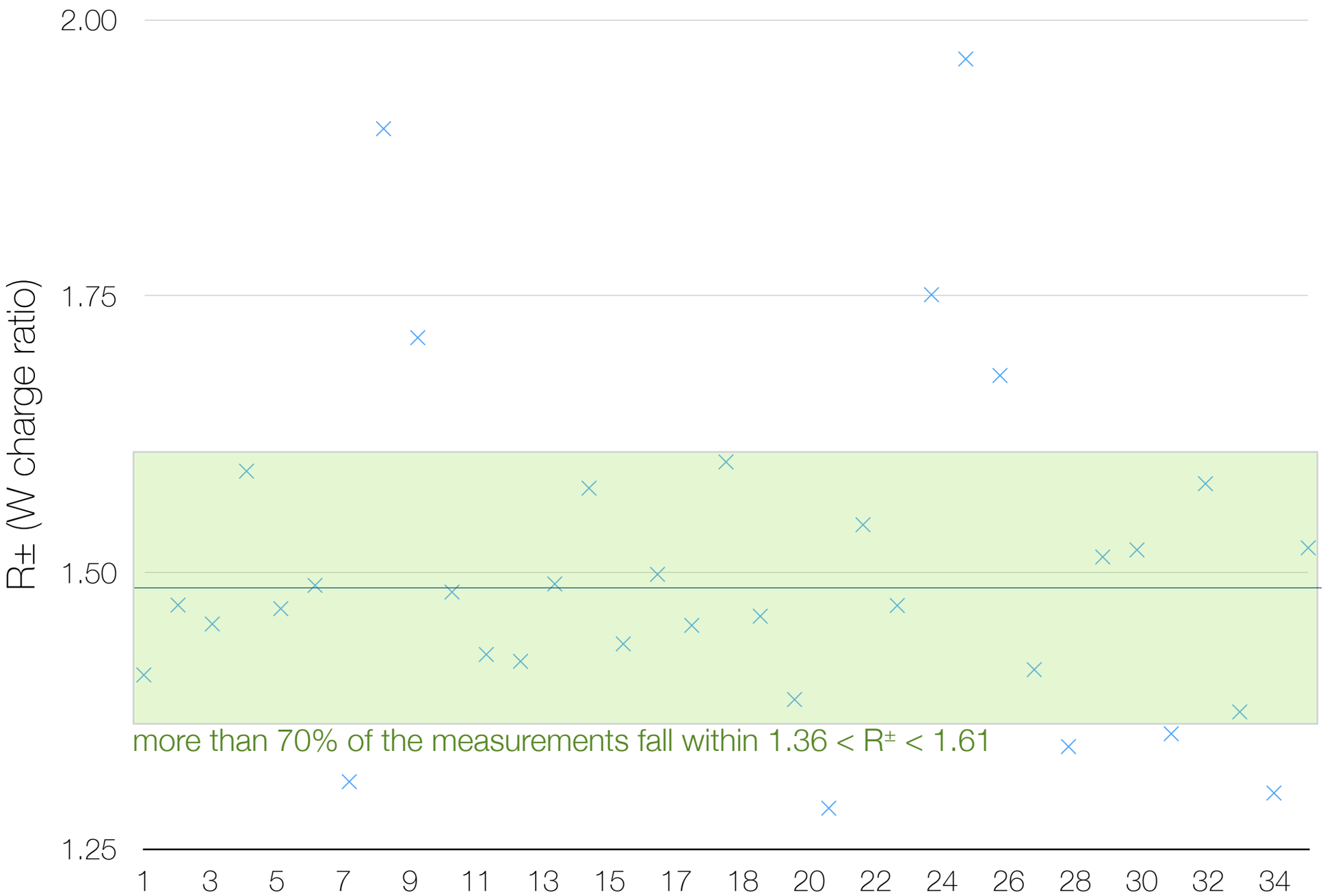
- Developed July-Feb 2015 by Stefan Schopmann and Michael Soiron (Uni Aachen), support from QuarkNet and Notre Dame
- Bugs first week of masterclasses – fixed
- Rated highly, great results
- CMS Masterclass very stable with continuous improvement

Center	Masterclasses	Countries	Videoconferences	Languages
CERN	49	17	10	
FNAL	29	10	11	
Combined	78	23	21	12

9th IPPOG meeting Paris
16-18 Apr 2015

Konrad on behalf of Uta Bilow, Sebastian Gemsheim,
Konrad Jende, Michael Kobel, Felix Socher

W Charge Ratio vs Institute



N_{events}	= 38’605
$N_{students}$	= 1’540
$N_{W\text{-}MC}$	= 35
S_W	= 98.6%
S_{WW}	= 80.8%

$$S_W = \frac{\text{number of W candidates found by students}}{\text{number of W candidates in data normalised to the analyzed amount}}$$

$$S_{WW} = \frac{\text{number of WW candidates found by students}}{\text{number of WW candidates in data normalised to the analyzed amount}}$$

$R^{\pm}_{tot} = 1.48 \pm 0.02$

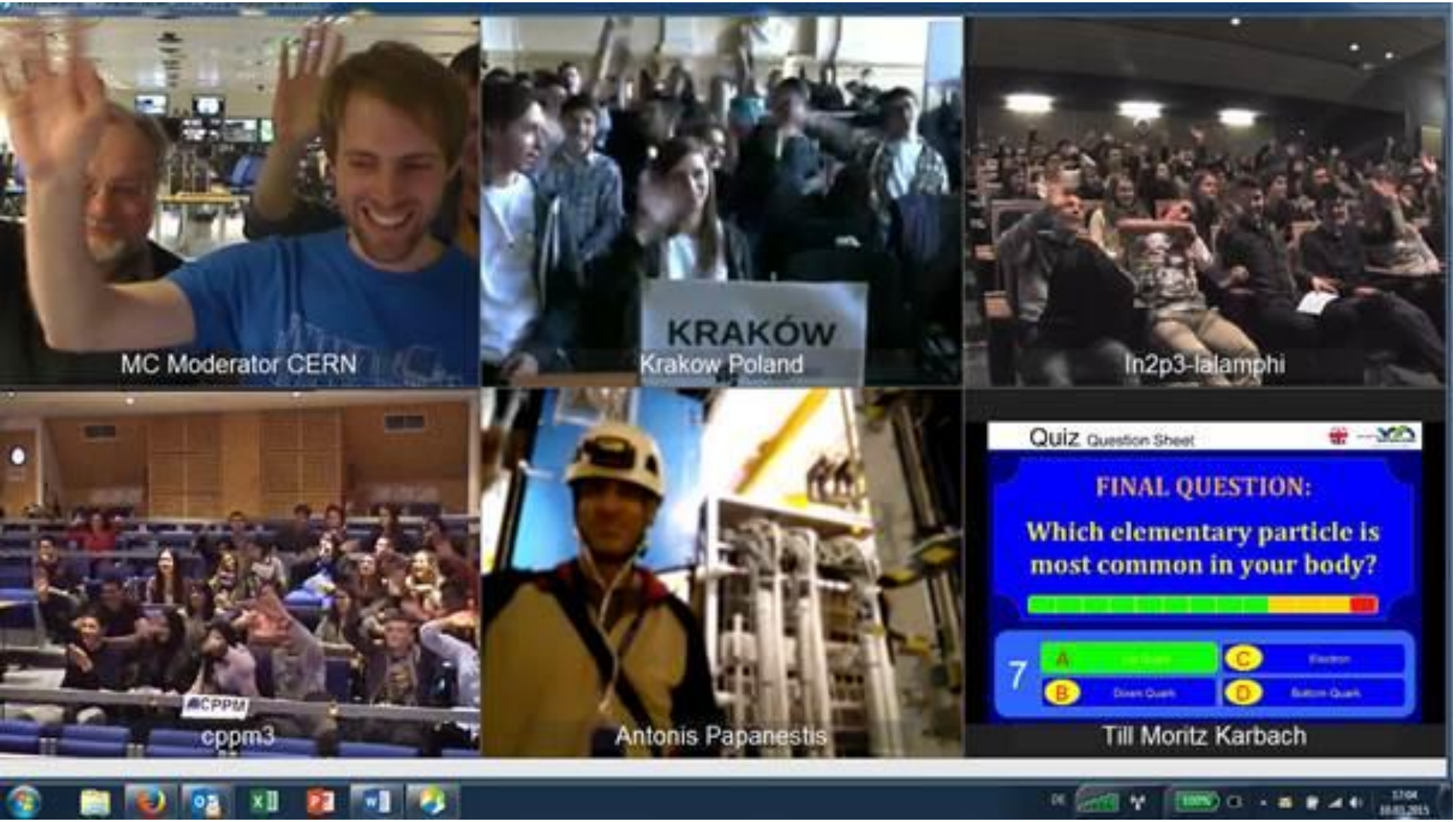
Year	$R^{\pm}_{tot}$
2011	1.37 ± 0.05
2012	1.23 ± 0.05
2013	1.22 ± 0.05
2014	1.22 ± 0.05
2015	1.48 ± 0.02

LHCb Masterclasseses 2015

Bolek Pietrzyk

Steering Group Meeting
16 April 2015, Paris

Vidyo conference



Vidyo conference

LHCb@InternationalMasterclasses
2015 Schedule

- March 05th : Paris LPNHE, Tarnow IFJ PAN, Amsterdam, Bologna
- March 10th : Orsay LAL, Krakow IFJ PAN, Marseille, Syracuse, MIT
- March 12th : Padova, Ferrara, Milano Bicocca, Marseille, Syracuse
- March 17th : Clermont-Ferrand, Marseille CPPM, Cagliari, Cincinnati
- March 18th : Firenze, Warwick, Genova, Cagliari
- March 25th : Valencia, Dortmund, Brazil UFTM, Genova, Firenze

8 Vidyo conferences (2 in the evening with US)

ATLAS Z-path

- Students use simple techniques and tools to measure known particles and discover new ones
- Z-path uses the invariant mass technique with the Z-boson as starting point

8 TeV ATLAS data analyzed by the students

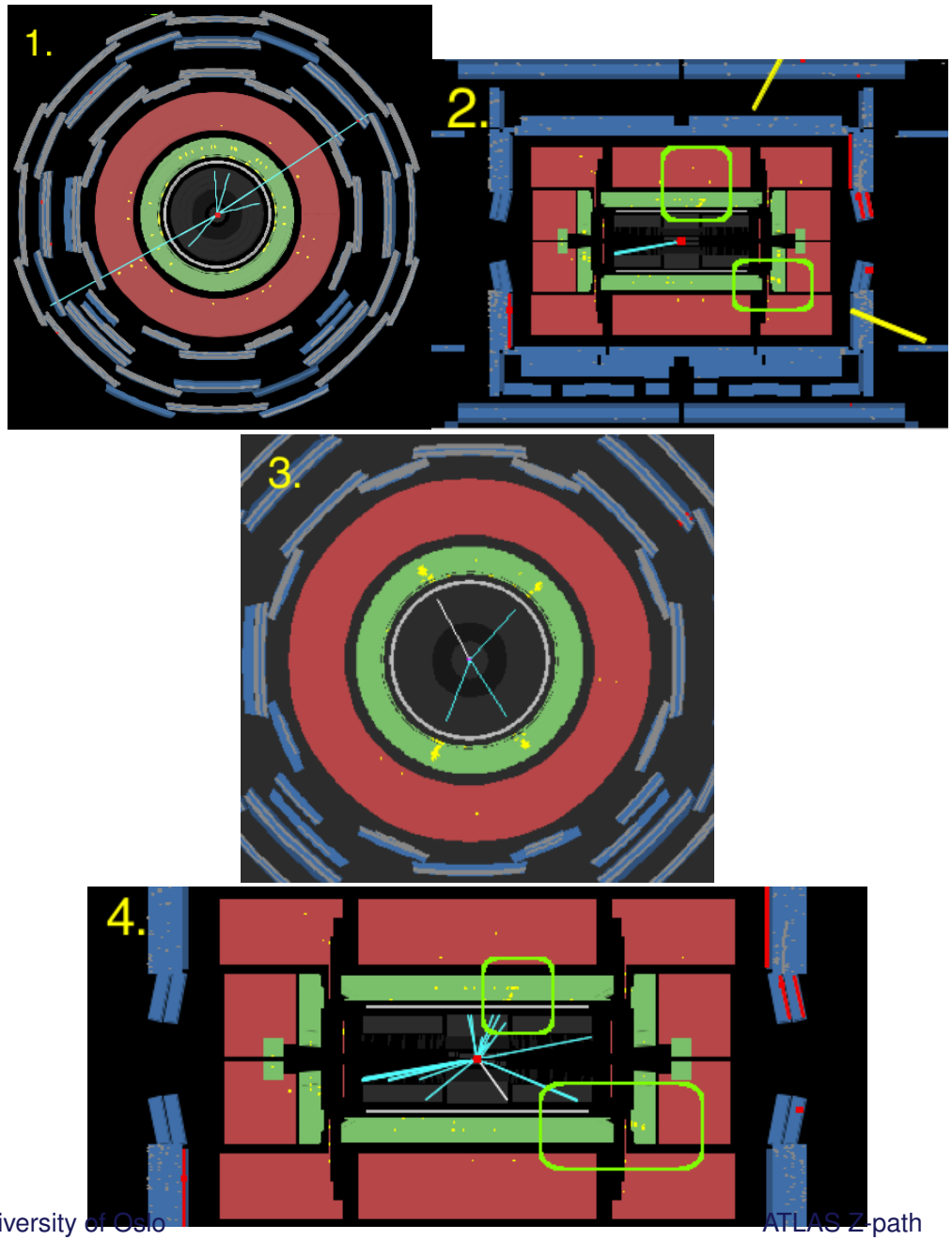
- Di-leptons: 20 000 events
  - $Z \rightarrow \ell^+\ell^-$, $J/\Psi \rightarrow \ell^+\ell^-$, $\Upsilon \rightarrow \ell^+\ell^-$
- Higgs $H \rightarrow \gamma\gamma$ candidates: 12 000 events (2 fb^{-1})
- Higgs $H \rightarrow 4\ell$ candidates: 40 events (2 fb^{-1})
  - $H \rightarrow 2 \times e^+e^-$ $H \rightarrow 2 \times \mu^+\mu^-$ $H \rightarrow e^+e^- + \mu^+\mu^-$
- $Z^{'} \rightarrow \ell^+\ell^-$ di-lepton events: 2000 fully simulated events

All data selected using official (or close to official) ATLAS selection criteria.
Data produced in an xml-format to be visually analyzed in event-displays.

- Each student (pair) analyzes 50 events
- Uses HYPATIA event-display (based on ATLANTIS)

Identifying events

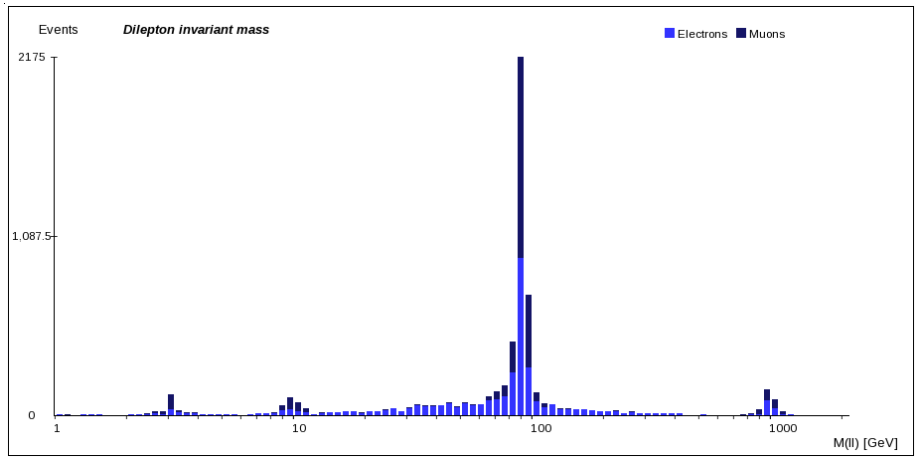
1. $\mu^+\mu^-$ or e^+e^- pair
   - J/Ψ, Υ, Z or Z' candidate
2. Di-photon event?
   - Higgs candidate!
3. Four “good” leptons?
   - Higgs $\rightarrow ZZ^*$ candidate!
4. Photons or electrons: photon conversions
   - Construct invariant mass of electron-pair - close to 0? $\rightarrow$ converted photon!
   - Cut on inner detector hits and momentum - do tracks disappear? $\rightarrow$ converted photon.



Overview of results in OPloT

- All students upload their results into the OPloT web-interface
  - OPloT php-based - developed in Oslo to ease submission, combination and discussion of results
- Results per institute and per day are automatically combined by OPloT

Student Masterclass results (di-lepton):

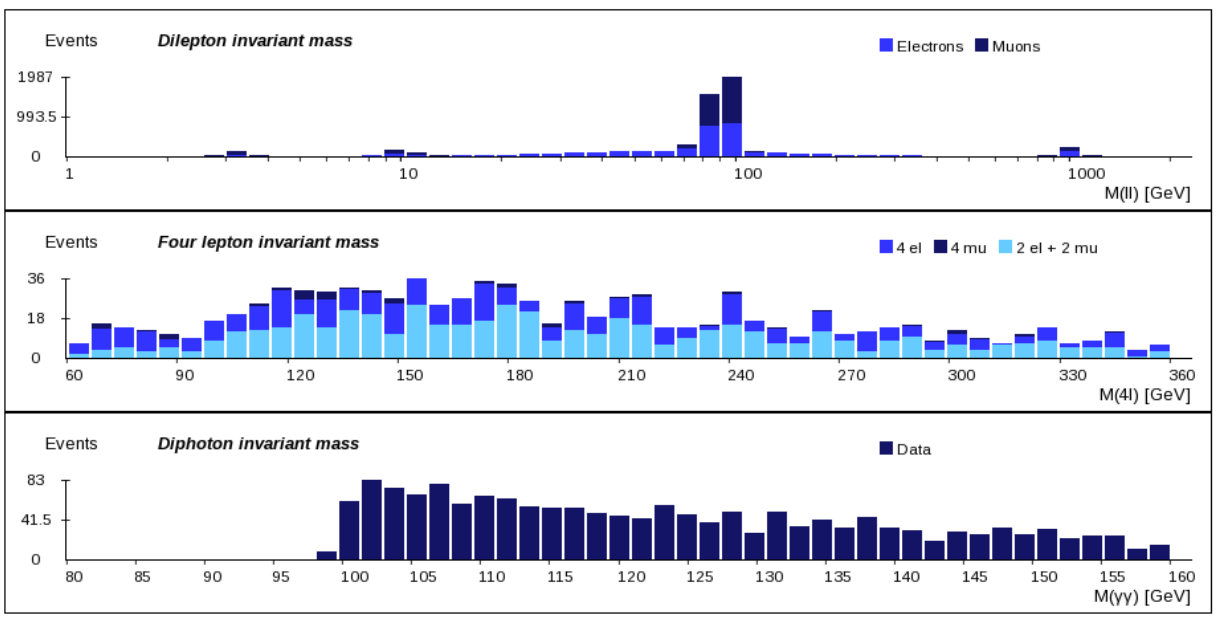


All results (di-lepton, 4-lepton and di-photon):

OPloT – MasterClass – Combination for all institutes on 2015-03-14

Start Student Moderator Tutor Administrator

Monday, April 13th 2015 - 15:25:01 CEST



Plot type: ll+4l+γγ overview

Dilepton statistics

	Electrons			
Region	R1	R2	R3	R4
Events	144	192	1494	145
Mean	3.00	9.63	89.75	994.34
Width	0.50	1.48	3.91	32.32

	Muons			
Region	R1	R2	R3	R4
Events	150	183	1839	149
Mean	3.08	9.90	90.52	990.89
Width	0.30	0.80	3.51	52.05

Number of events

	Student distribution	Expected
ll	6807	7800
4l	1172	40
γγ	1667	3600
Sum	9646	11440

The Z-path in the International Masterclasses 2015 and in the future

The Z-path in 2015

- 86 different institutes, in total 100 Z-path events
- in 24 countries
- on 5 different continents
- distributed on 19 days (between February 25th and April 1st)
- video conferences with both CERN and Fermilab


Introducing the Z boson

The Z-path in the future


Discover the Unknown

- continue developing education material based on ATLAS data & results
- prepare for possible new discoveries (Graviton, SUSY etc.) using similar final states
- introduce more advanced looping over events after having studied 50 display events and set-up cuts and plot invariant mass and other variables
- university projects at bachelor, master and Ph.D. levels based on open access ATLAS data, with possibilities to further develop the current tools and extend the ideas
- take part in open access and preservation of data for education

ALICE : Looking for strange particles - 2015 Masterclasses

14 International Physics Masterclasses
(+1 at CERN, school from New Zealand on CERN visit, 7.4.2015)
Total ~ 500 participants
Newcomers : Maynooth (Ireland), Trieste

Feedback positive and enthusiastic
•Comments on collection of results
-from visual analysis : too slow - maybe skip in the future?
-google spreadsheets : safe? Extended sheets with statistics to be used in the future
•Some comments on videconference (sound quality..); too long?

Measurement stable - No plans for change
Virtual machine used in some cases
CERN : used s'cool lab