



SMU®

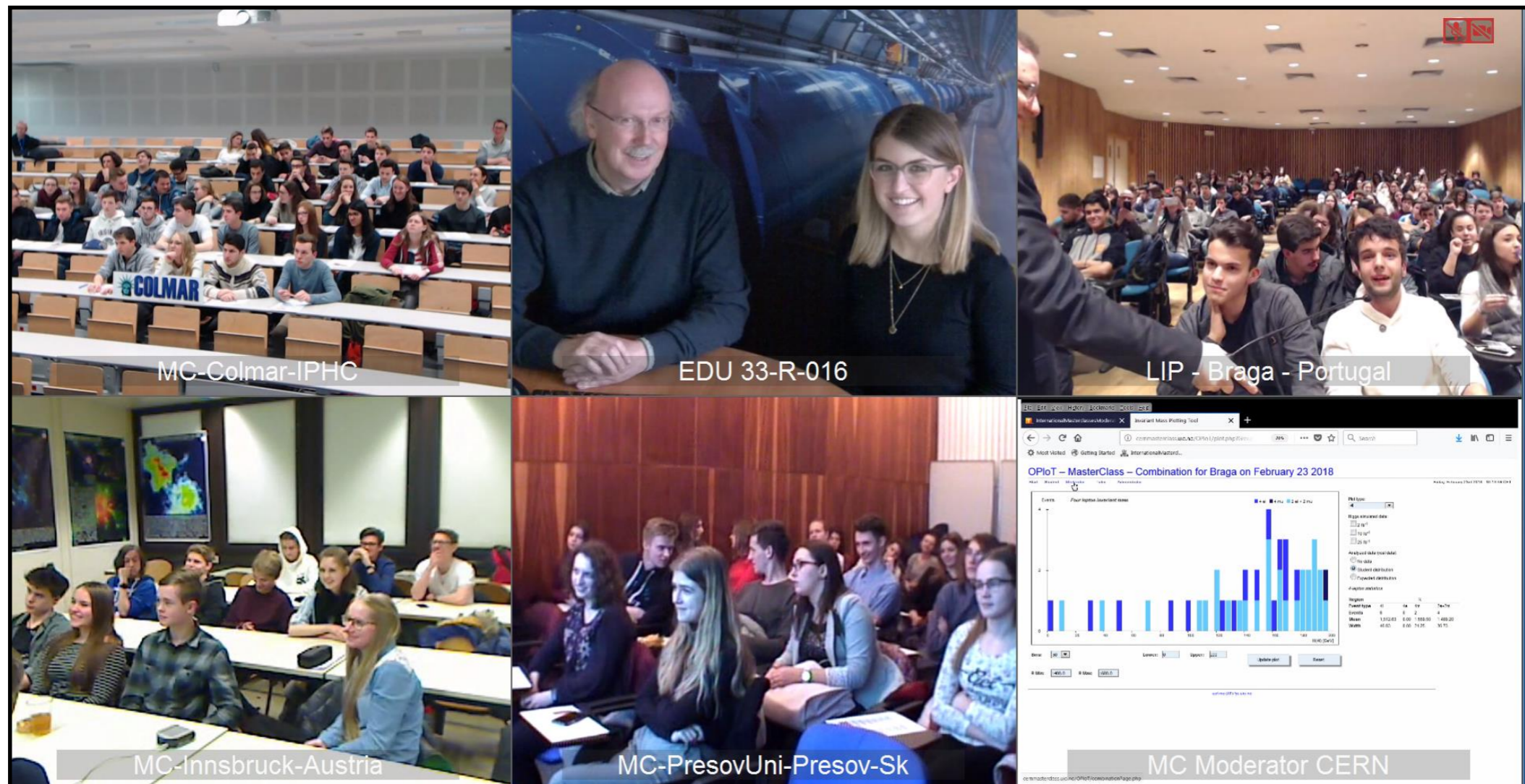


PPOG International Masterclasses 2020 The Video Conference

Katharine Leney
20th February 2020

Moderators

- You are going to be the face of CERN to hundreds of students around the world!
- In pairs you will hold a video conference via Vidyo to a group of institutes who have all done the same masterclass exercise during their day.
- The video conference (VC) allows the students to come together to combine and discuss their results under your guidance in a light hearted and fun way.



Aims of the Video Conference

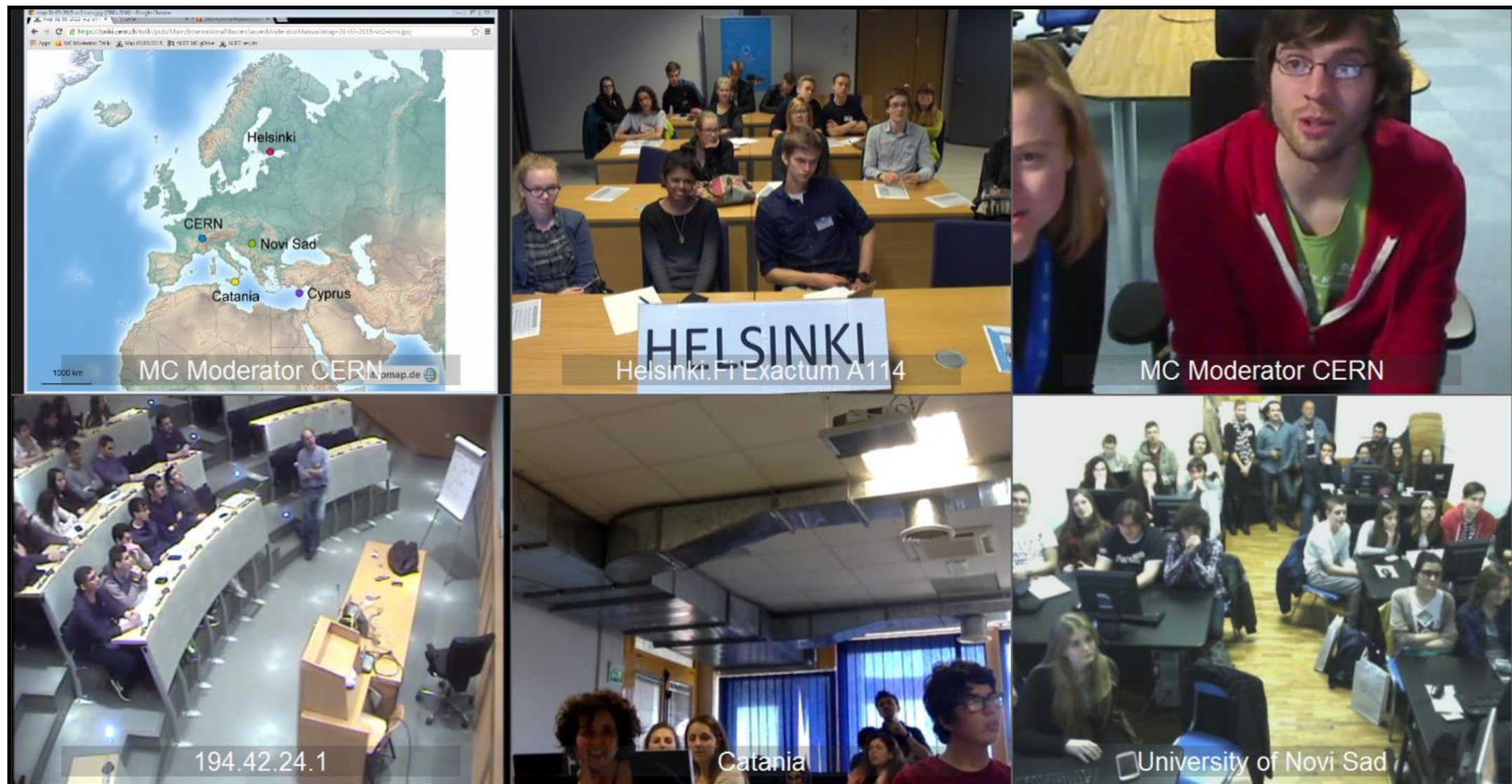
- Convey the internationality of the event.
- Demonstrate how physicists work together internationally.
- Encourage students to exchange experiences between masterclasses.
- Demonstrate improvement in accuracy by combination of different data sets.
- Be a FUN end to a long day!

3-5 institutes participating in each session



Things it should *not* do...

- Provide a deeper understanding of the physics.
- Teach English to the students.
- Contain a basic discussion of the measurement.
- Create a competition between the institutes.



General Information

- Moderators Manual – has all the information you need for the VC!
 - https://twiki.cern.ch/twiki/pub/Main/InternationalMasterclassesModeratorManual/manual_moderators_2020.pdf
- TWiki has quick links and information.
 - <https://twiki.cern.ch/twiki/bin/view/Main/InternationalMasterclassesModeratorManual>
 - Bookmarked on the 'favourites' bar of Internet Explorer in the VC rooms.

Preparation for the video conference

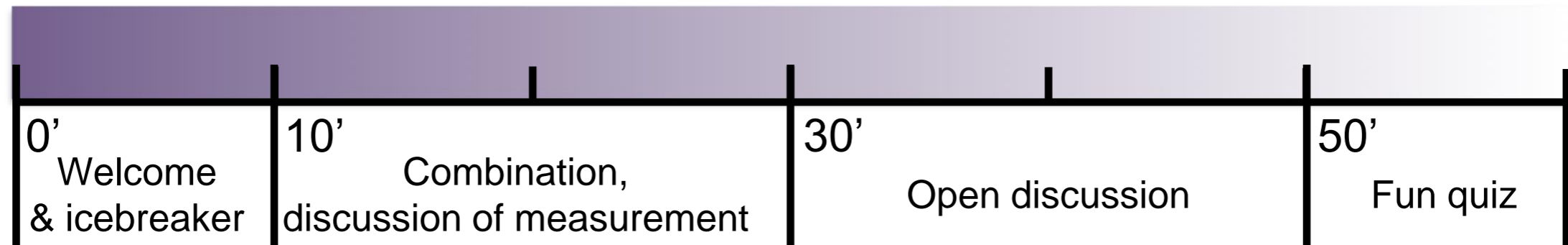
Arrive 30 minutes before the start of your video conference and prepare/upload all the material, including:

- masterclass [map](#)
- [table/website](#) for combination of results
- animated [quiz](#)

Make sure you have downloaded what you need onto the desktop (quiz and map), you are able to access the tables and results, you know how to share these on vidyo, especially the animated quiz!

- Use Vidyo to setup the video conference.
 - Step by step instructions are in the Twiki.
 - Make sure you know how to use the shared desktop.
 - Mute any noisy participants if necessary!

Video Conference Timeline



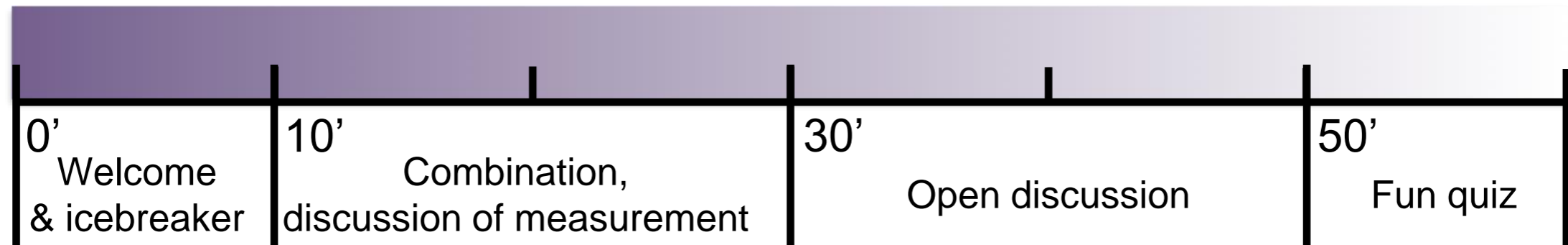
- One hour video conference (16h – 17h sharp) with 3-5 institutes.
- Arrive at the correct room at 15:30 to get everything setup and prepared.
- Three locations for the VC (check in advance which location you should be at!):

VC1 - Mondays: 4/3-004. Key from Theory Department Secretariat
- Tuesdays-Saturdays: 42-R-403. Electronic lock - need your access card to open (validate on stations at entrance to B42!).

VC2 - 600/R-001
- Electronic lock - need your CERN access card to open and close the lock (validation station in entrance hall of B31, from where you access B600).

- Details available on the [TWiki](#) and in the [Manual](#)

Welcome & Icebreaker



The welcome has to be on schedule, clear and interactive!

- Students should immediately feel that this is a two-way conversation and they should actively take part in the VC.
- Introduce yourself, say a little about your research and explain where you are.
 - “Hello! My name’s Katharine and I work on the ATLAS detector. My research focuses on searching for new particles that can decay to two Higgs bosons.”
 - “Right now we are sitting at CERN. CERN is the largest centre for particle physics research in the world and *the* place to be for a particle physicist”
- Go through the VC timeline and explain what will be happening in the next hour.

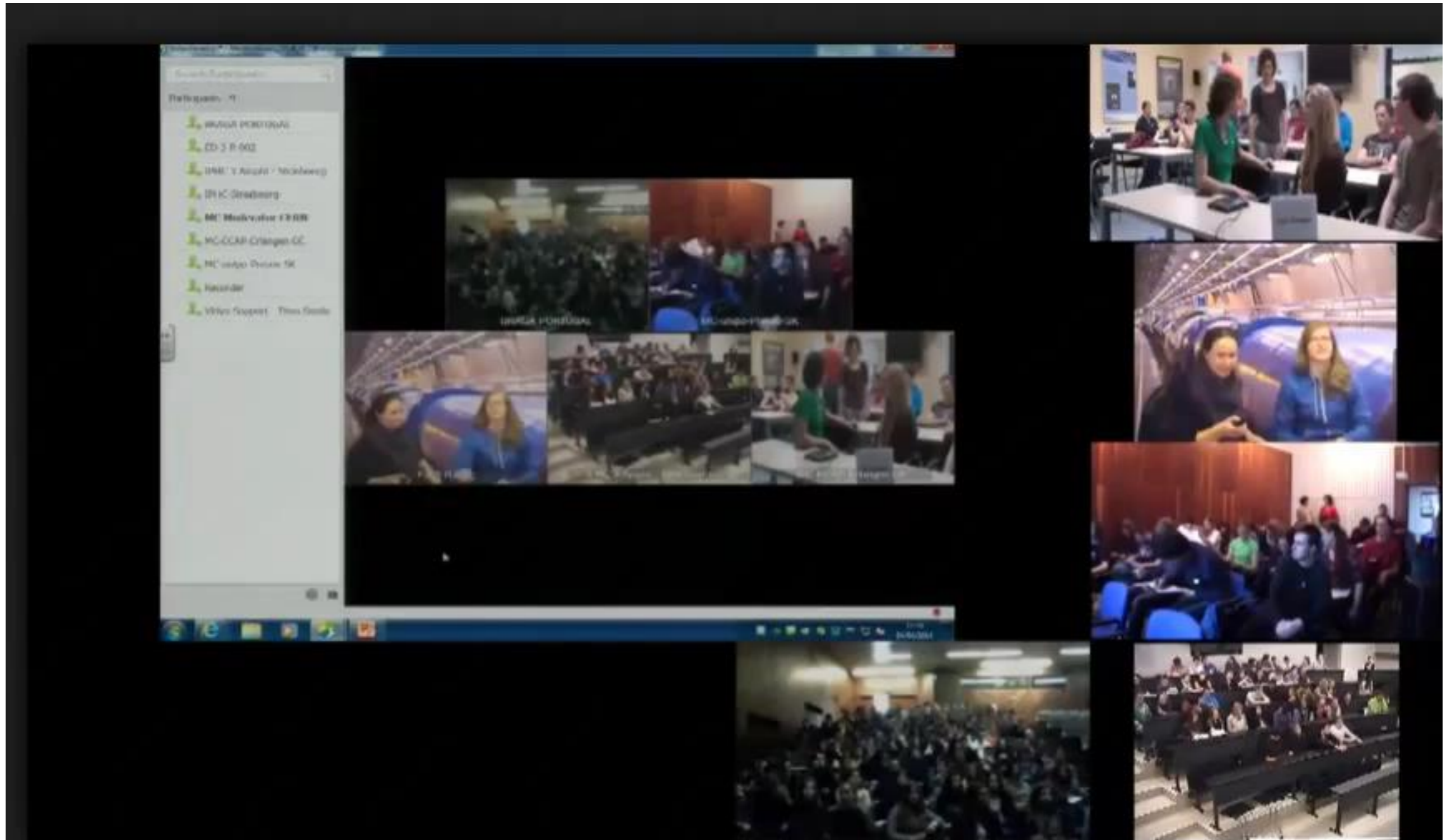
Welcome & Icebreaker

0'	10'	30'	50'
Welcome & icebreaker	Combination, discussion of measurement	Open discussion	Fun quiz

- Share a map showing all the connected sites.
 - Use to explain to the institutes in which order they will be addressed (e.g. north to south).
- Ask one short, friendly question to each institute (sometimes suggested by the local organisers).
 - “Barcelona, how did you find the exercises today?”
 - “Vienna, have you seen the VERA accelerator?”
 - More ideas for questions [here](#) (and linked from the [TWiki](#)).



Welcome & Icebreaker



Discussion of Measurements & Combination

0'	10'	30'	50'
Welcome & icebreaker	Combination, discussion of measurement	Open discussion	Fun quiz

- Share the combination results on Vidyo.
- Summarise and comment on the combination.
 - Note that all groups in the VC have done the same measurement, but using different datasets.
- Compare to the theory/experimental results.
- Stress why using different data from different sources is beneficial (stats and reduces bias).

Analysis

Total #	W → ... + ν				Background	WW
	e ⁺	e ⁻	μ ⁺	μ ⁻		
1615						
ATP	56	56	56	56	343	133
Bonn-NTW						
BSZ Riesa	18	27	22	16	86	21
Hamburg-NTW-1	25	17	19	14	149	20
R.-Hildebrand-Gym. Ma	0	0	0	0	390	91
Total	99	100	97	86	968	265
Σ W ⁺ ,Σ W ⁻	W ⁺	196	W ⁻	186	W ⁺ + W ⁻	382
Ratio	W ⁺ / W ⁻		1.0538	±		0

Comparison with results of the ATLAS collaboration (from 2011):
 Measurement of the W → lν and Z/γ → ll production cross sections in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector*) and Search for the Standard Model Higgs boson in the H → WW(→) → lνlν decay mode using 1.7 fb⁻¹ of data collected with the ATLAS detector at sqrt(s) = 7 TeV**)

*) Authors: The ATLAS Collaboration (Submitted on 5 Dec 2011): <http://arxiv.org/abs/1109.5141.pdf>
 **) Authors: The ATLAS Collaboration (24 Aug 2011): ATLAS-CONF-2011-134

	W → ... + ν				Background	WW cand.
	e ⁺	e ⁻	μ ⁺	μ ⁻		
Total	77885	52856	84514	55234	21930	469
Σ W ⁺ ,Σ W ⁻	W ⁺	162399	W ⁻	108090	W ⁺ + W ⁻	270489
Ratio	W ⁺ / W ⁻		1.50	±		0.01

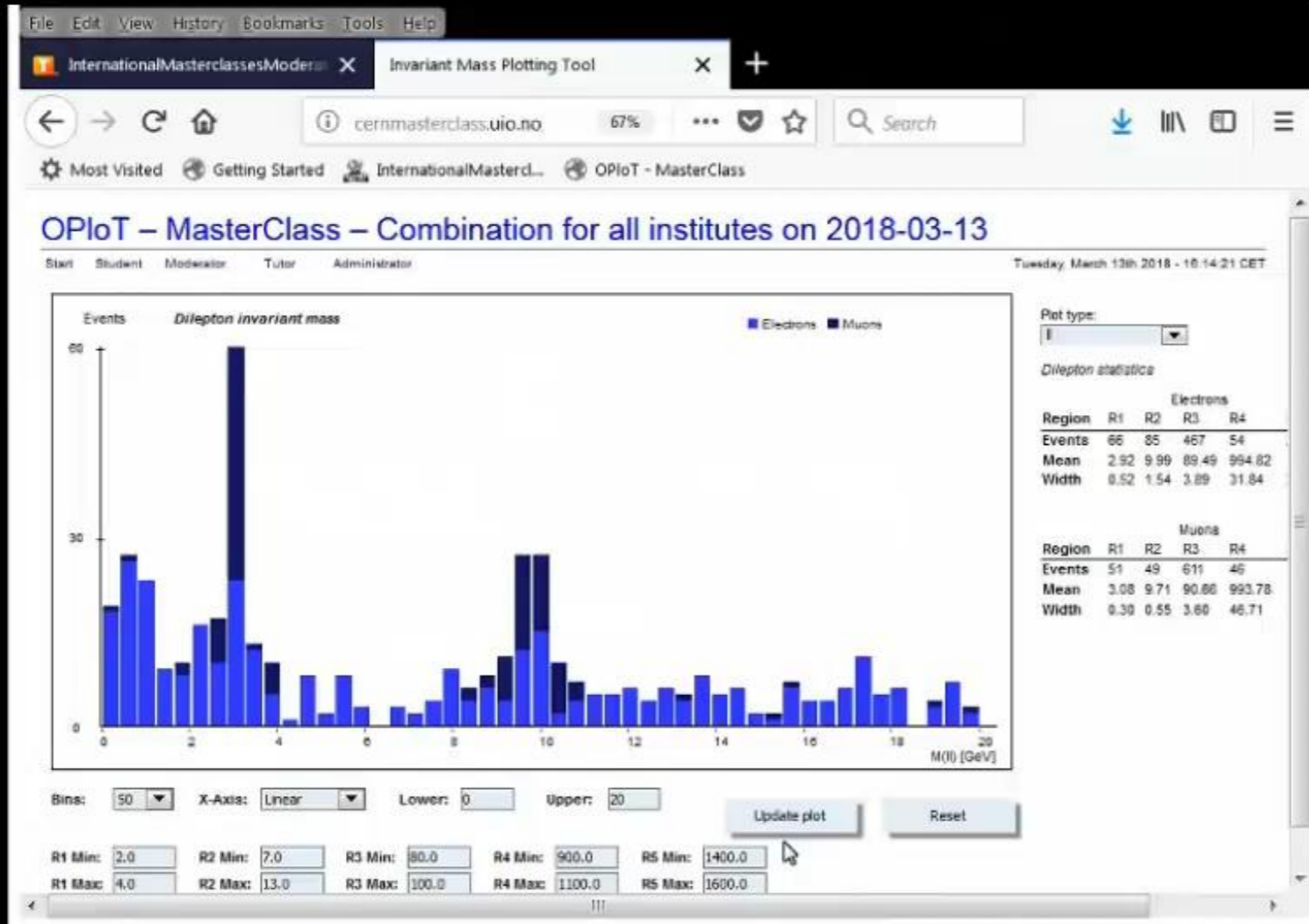
Discussion of Measurements & Combination

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- Ask each group questions about their measurement.
- Questions have been pre-agreed by the authors of each measurement.
- Examples include:
 - Where are the peaks in the mass histogram? What do they represent?
 - How would you interpret the blue and green areas? What do they mean?
- See the TWiki for list of questions for each measurement.
 - <https://twiki.cern.ch/twiki/bin/view/Main/InternationalMasterclassesModeratorManual#P>

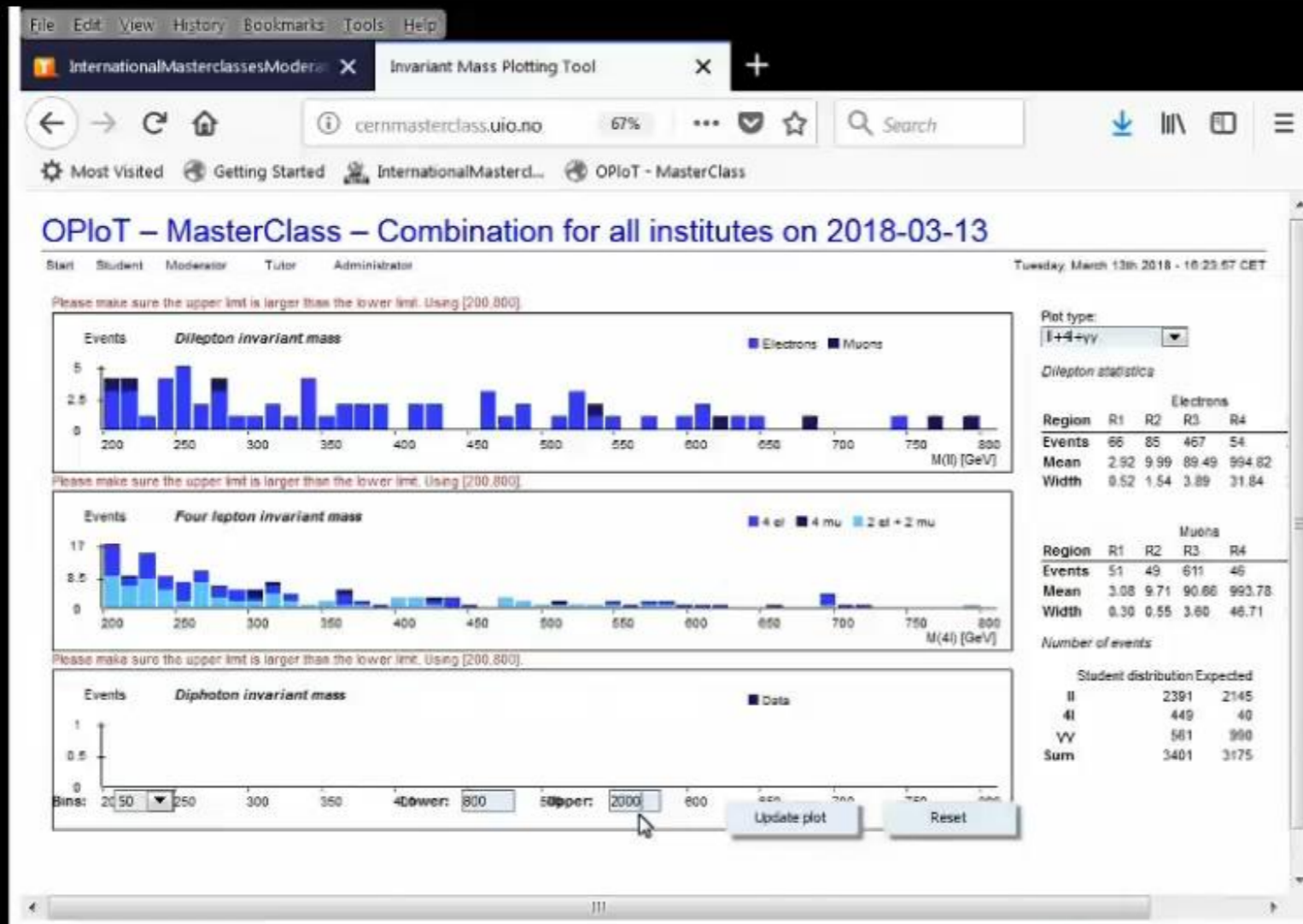


Discussion of Measurements & Combination



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Discussion of Measurements & Combination



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Open Discussion

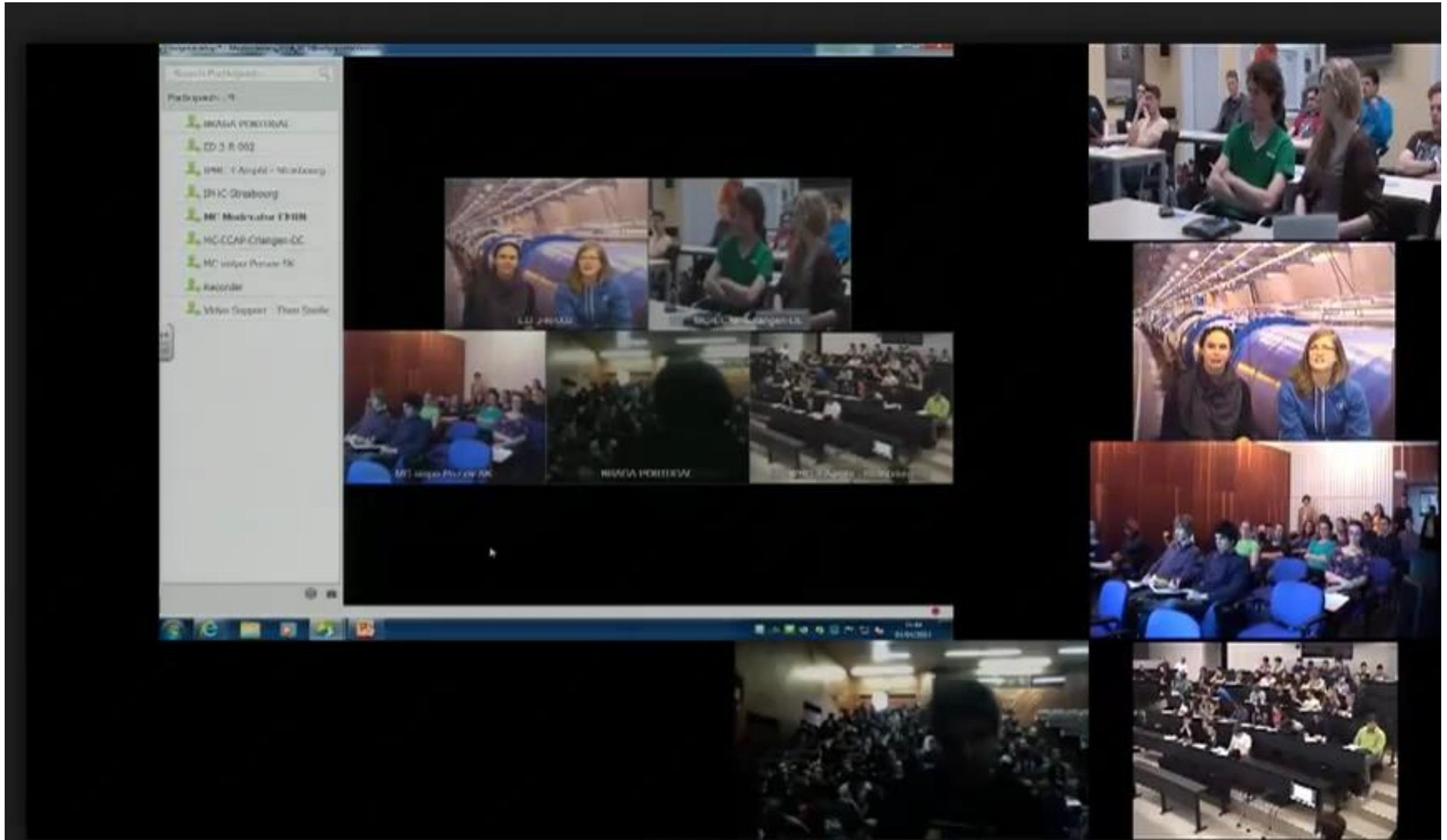
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- Discussion expands to more open and general questions. They can be on anything from...
 - Life at CERN.
 - LHC size/magnets/cost/power consumption.
 - The Big Bang, dark matter, black holes, time travel...
 - How to become a particle physicist.
- Repeat/rephrase the question to:
 - Make sure you understood correctly.
 - Help other groups understand.

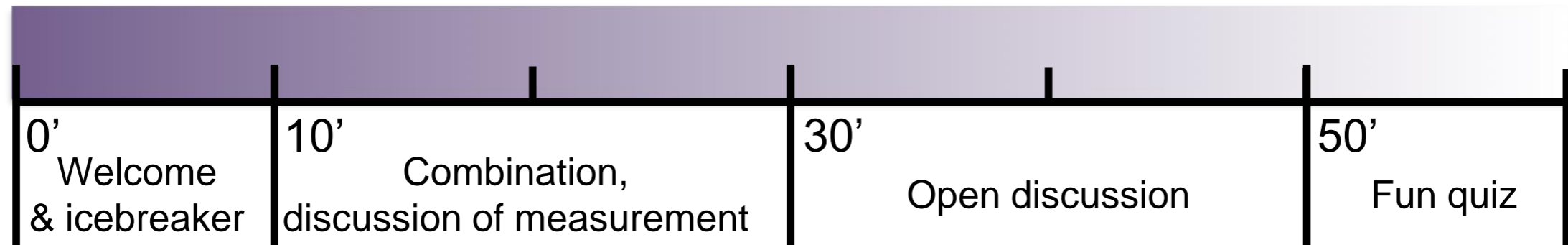


Give concise, interesting answers!

Open Discussion



Quiz



“Who Wants To Be A Millionaire” style quiz.

- Moderators show English version on shared desktop.
- Local-language version may be shown locally in parallel.
- Seven multiple-choice questions.
- Correct answer revealed after each question.
- Each student plays alone and does their own scoring.
- No comparisons, no prizes.

Quiz Answersheet

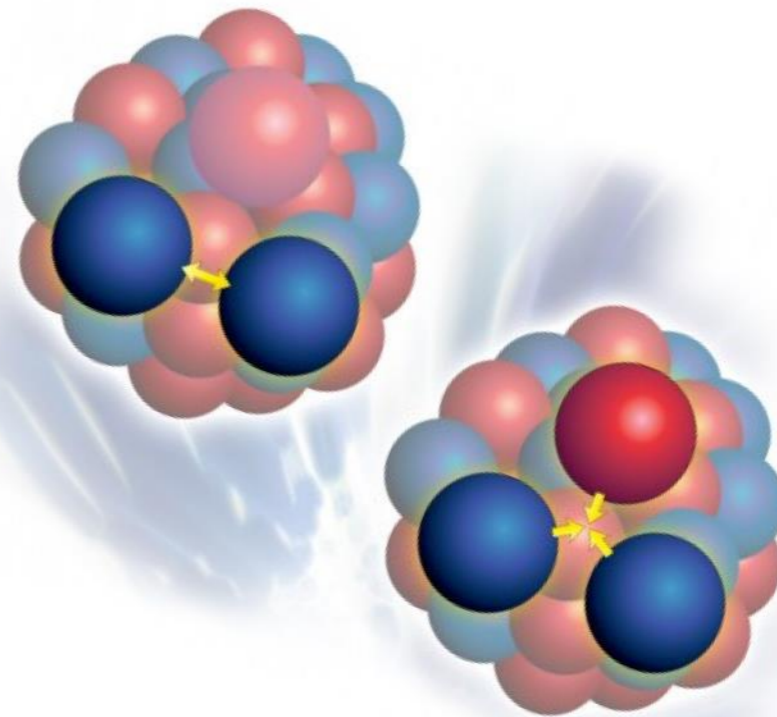
1	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	7 TeV Full beam energy of the LHC
2	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	172.9 GeV Mass of the top quark
3	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	91.2 GeV Mass of the Z boson
4	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	938.3 MeV Mass of the proton
5	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	105.7 MeV Mass of the muon
6	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	2.5 MeV Mass of the up quark
7	A. <input type="radio"/>	B. <input type="radio"/>	C. <input type="radio"/>	D. <input type="radio"/>	<input type="radio"/>	0.511 MeV Mass of the electron

Your score
Tick off one energy step for each correctly answered question, starting at the bottom

Quiz

- 1) Read out question → 2) Start timer → 3) Reveal correct answer and answer choices

Which particle is the mediator of the strong force?



1

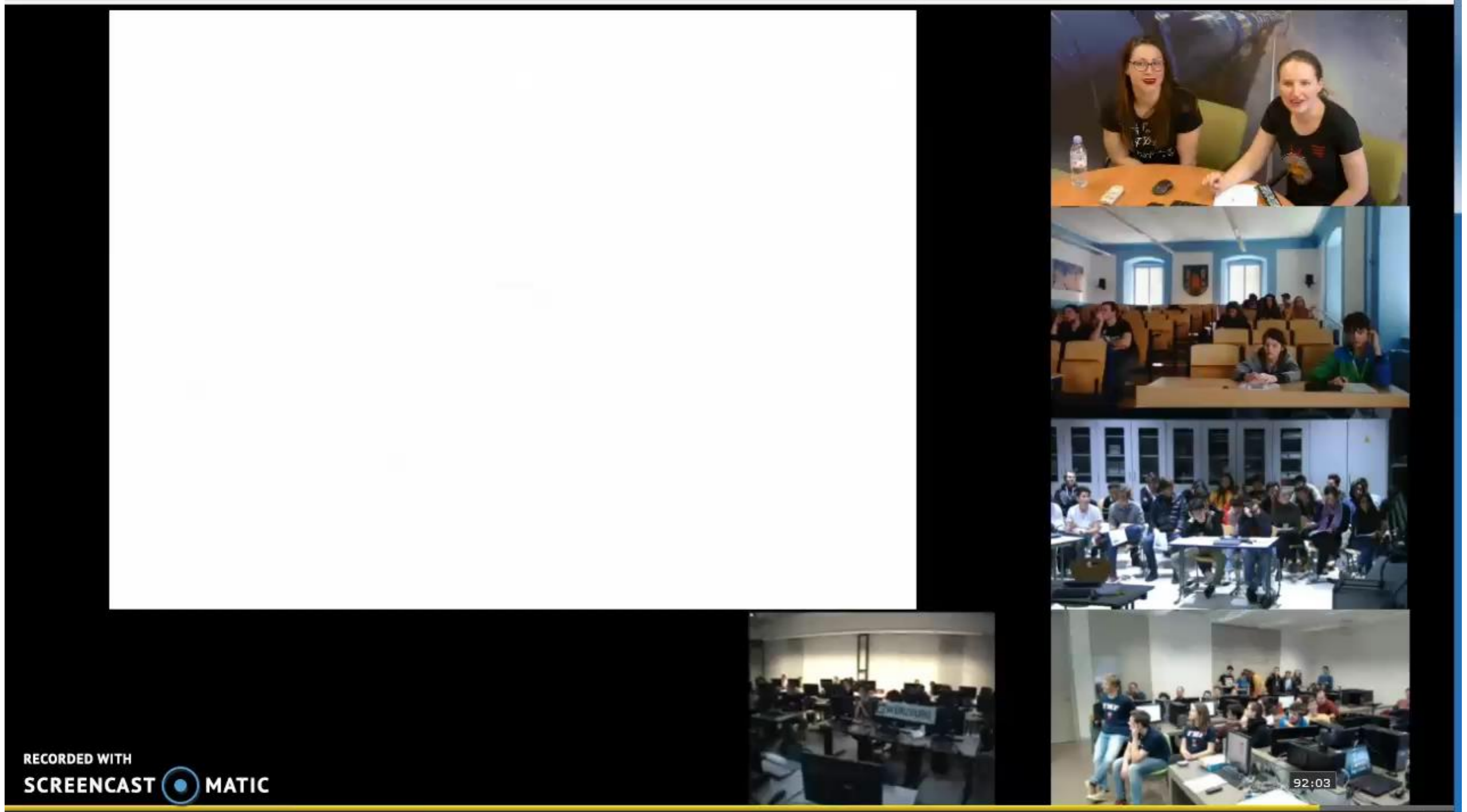
A. Neutralino

B. Z boson

C. Gluon

D. Quark

Quiz



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Goodbye

0'	10'	30'	50'
Welcome & icebreaker	Combination, discussion of measurement	Open discussion	Fun quiz

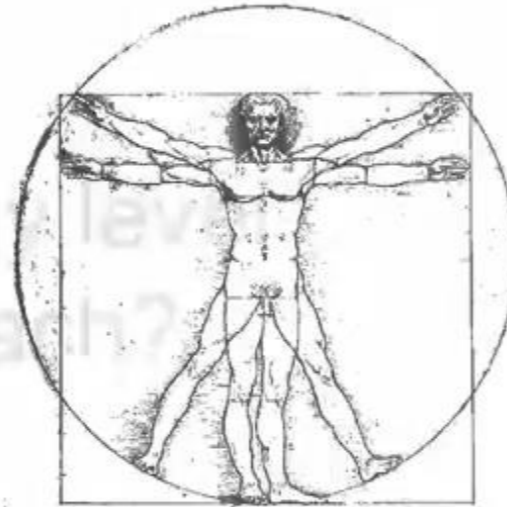
There must be a clear and common end to the VC after one hour.

- Say goodbye to everyone and thank them for taking part.
- Do not keep discussion going even if the students are still asking questions.
 - If they and you want some discussion can continue after the goodbye on a voluntary basis.



Goodbye

Which is the most common elementary particle in your body?



A. Up quark

B. Down quark

C. Electron

D. Bottom quark



Summary

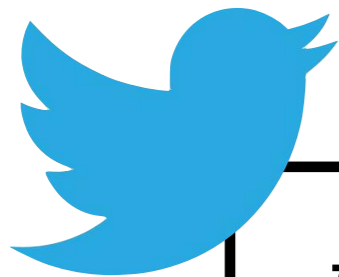
- Arrive 30 minutes before the start of the VC.
- Set up the Vidyo conference following the step by step instructions on the TWiki (instructions also in the manual).
- The quiz should already be downloaded on the desktop of the PC (if not it can be downloaded from the TWiki).
 - Check that you can open the quiz as a slide show and share it.
- Download the map - this must be done each time.
- Have the link to the tables for the combination already open.
- Follow the suggested timeline where possible, but use some common sense too.
 - e.g. if there are few institutes joining and the students don't have lots of questions then you may finish a bit early - that's fine!

All the info you need is on the TWiki and in the manual:

- <https://twiki.cern.ch/twiki/bin/view/Main/InternationalMasterclassesModeratorManual>
- https://twiki.cern.ch/twiki/pub/Main/InternationalMasterclassesModeratorManual/manual_moderators_2020.pdf

Social Media

- Feel free to post on Twitter!
 - Interesting questions you were asked.
 - Anything unusual or interesting with the combination.
 - Any interesting questions you were asked.
 - Links you wish to share.



#LHCIMC
@physicsIMC



And Finally...

Smile, initiate two-way conversations with the students, and have FUN!

