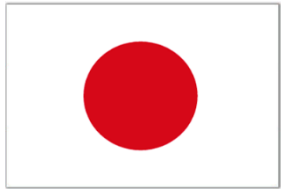
JENNIFER

EU grant n.644294

Masterclasses contribution



Japan and Europe Network for Neutrino and Intensity Frontier Experimental Research

INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS

International Masterclasses 2015

Central Coordination

IPPOG meeting – 17.04.2015 - Paris

INTERNATIONAL MASTERCLASSES

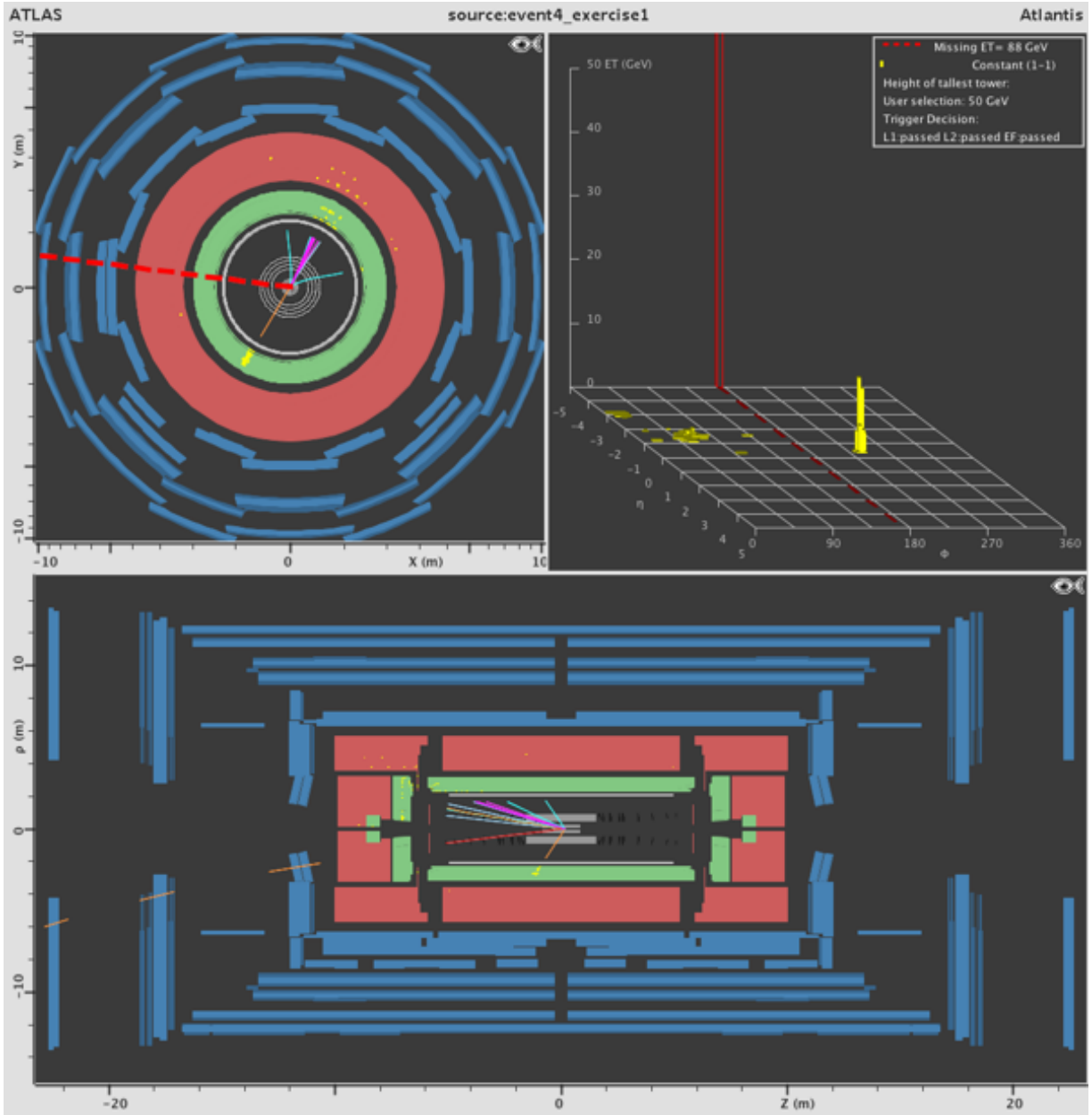
hands on particle physics

What are masterclasses ?

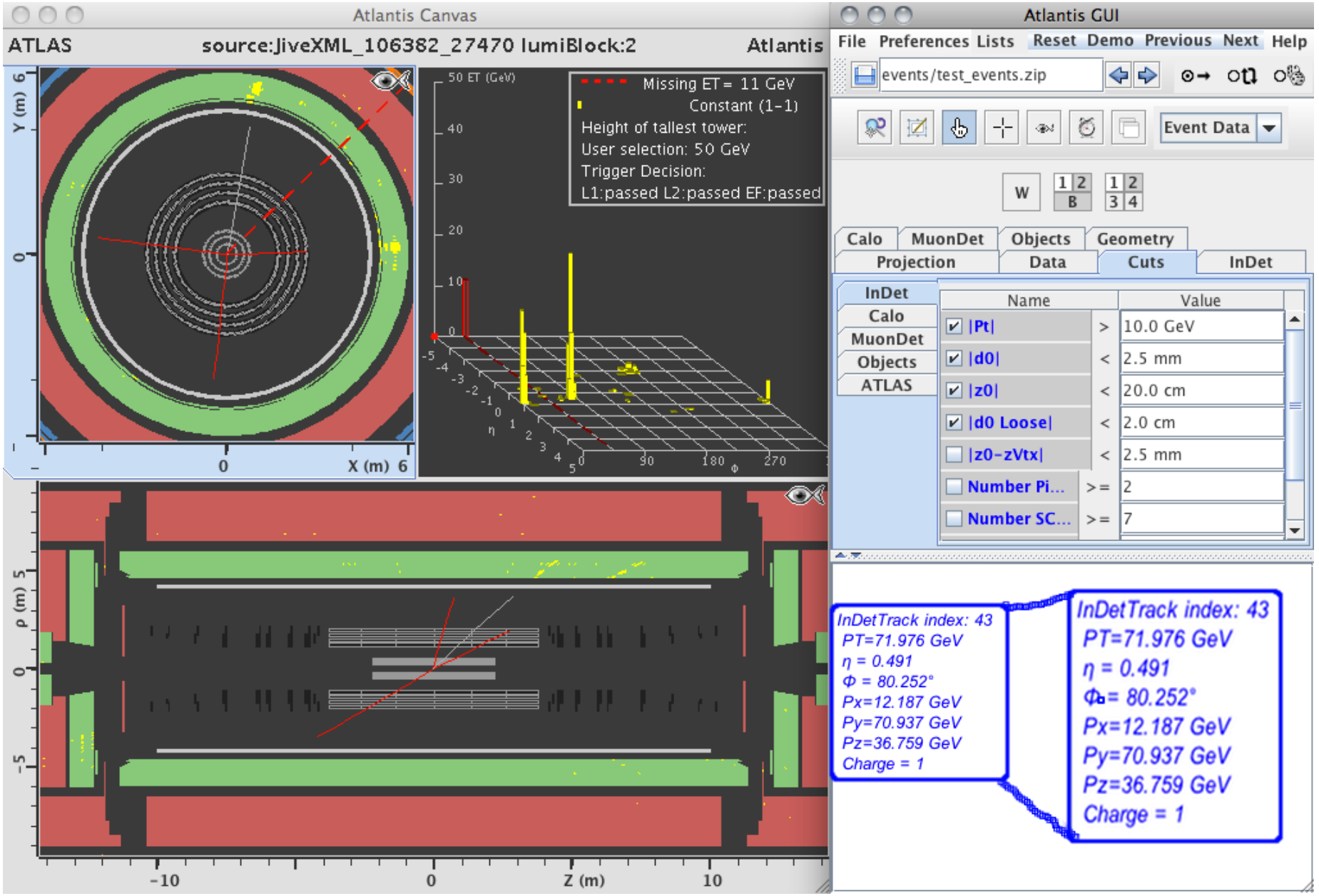
INTERNATIONAL MASTERCLASSES
hands on particle physics

- High school students (tipically last year students) spend one day in a university or research center in particle physics
- First they get 3 or 4 lectures from young physicists to introduce them the basics of particle physics, accelerators and detectors
- Then they get a sample of real data events from one of the current CERN experiments (ATLAS, CMS, ALICE, LHCB…) and an event display program
- They get explanations of how to select a special class of events (a particular Higgs decay for example), to count them and to measure observables (i.e. mass…)
- At the end of the day many masterclasses sites connect in video conference to CERN and put together their analyses on the same class of events, obtaining a higher statistics result.
- Only some specific days allow connection to CERN, but many masterclass events are organized also in standalone mode
- Gadgets and small prizes are provided to best students from CERN

Example of the ATLAS program to display and analyze events

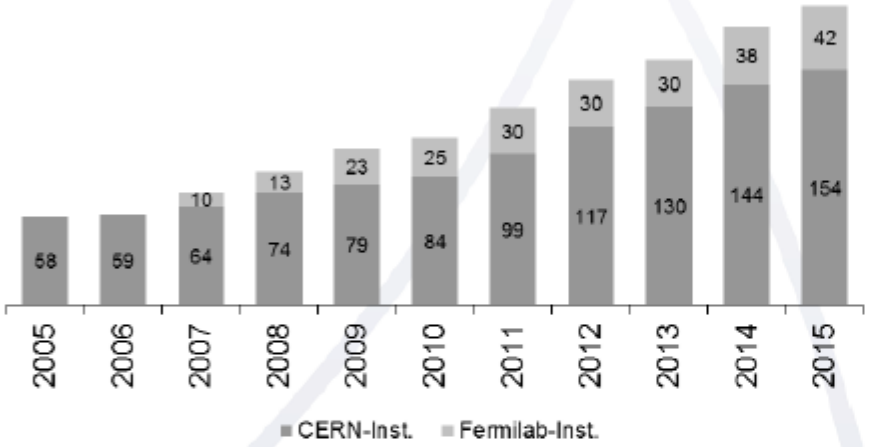


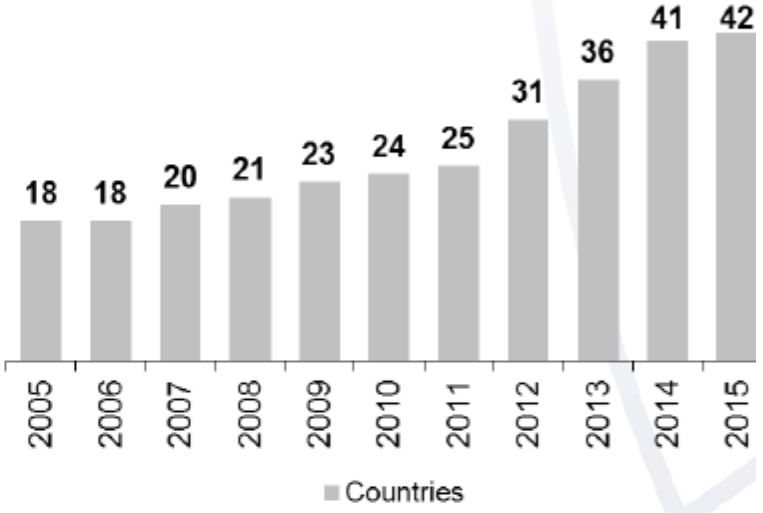
A lot of useful tools…

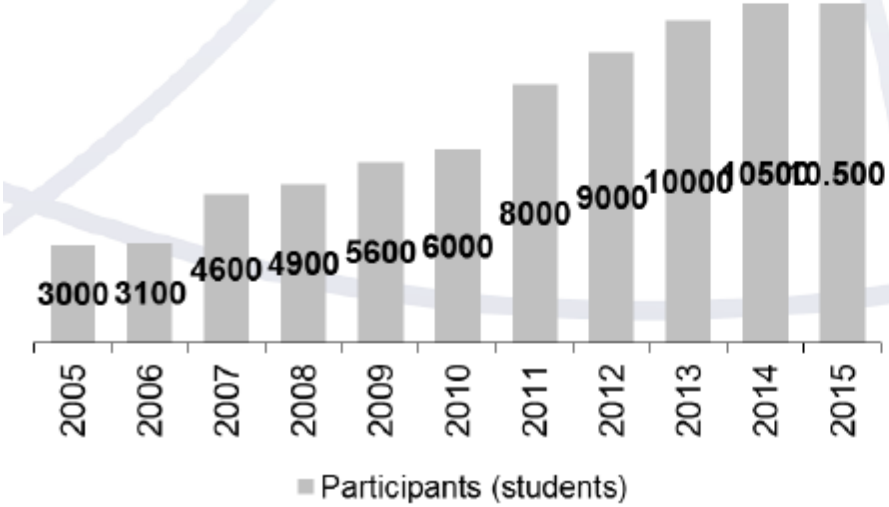


Masterclasses are very popular !

Participation Statistics







- 193 Institutes (154 + 42)
- 255 Masterclasses (213 + 45)
- 10.500 High-school students (estimated) incl. 1040 in Fermilab

INTERNATIONAL MASTERCLASSES
hands on particle physics

IMC in 2015

Also in Japan some event is organized by LHC groups

42 Countries – New: Morocco

International Masterclass Day* in October or November

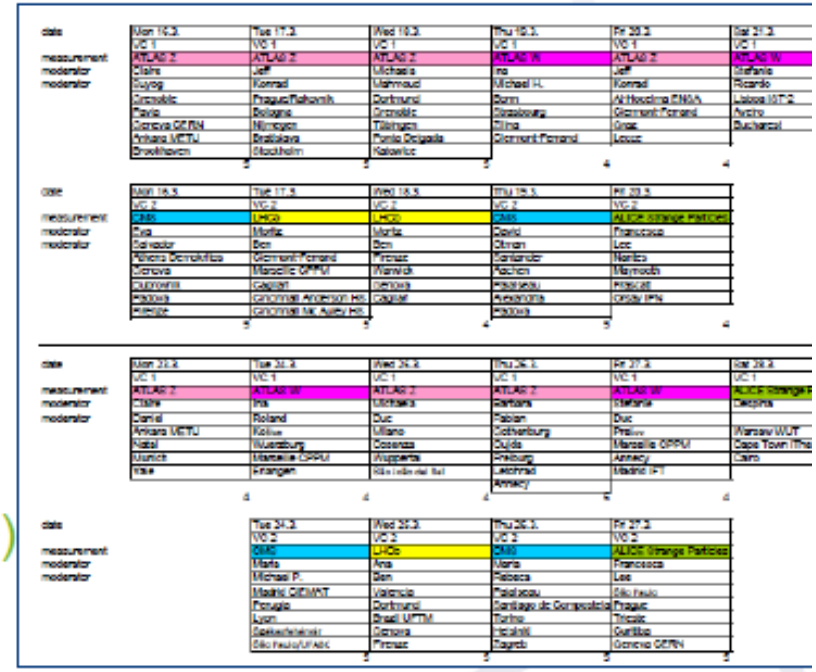
Virtual Masterclasses

INTERNATIONAL MASTERCLASSES
hands on particle physics

A considerable organizational effort !

Creating the Schedule

- CERN: 26.2. – 2.4.2015 (32 days) (2014: 26)
- 213 (199) Masterclasses (Fermilab: 45)
  - ALICE: 18 (14)
  - ATLAS W: 37 (51)
  - ATLAS Z: 84 (67) (15)
  - CMS: 46 (46) (30)
  - LHCb: 28 (21)
- 51 (48) VCs with CERN; 18 with FNAL (12)
- 154 (144) institutes/sites registered



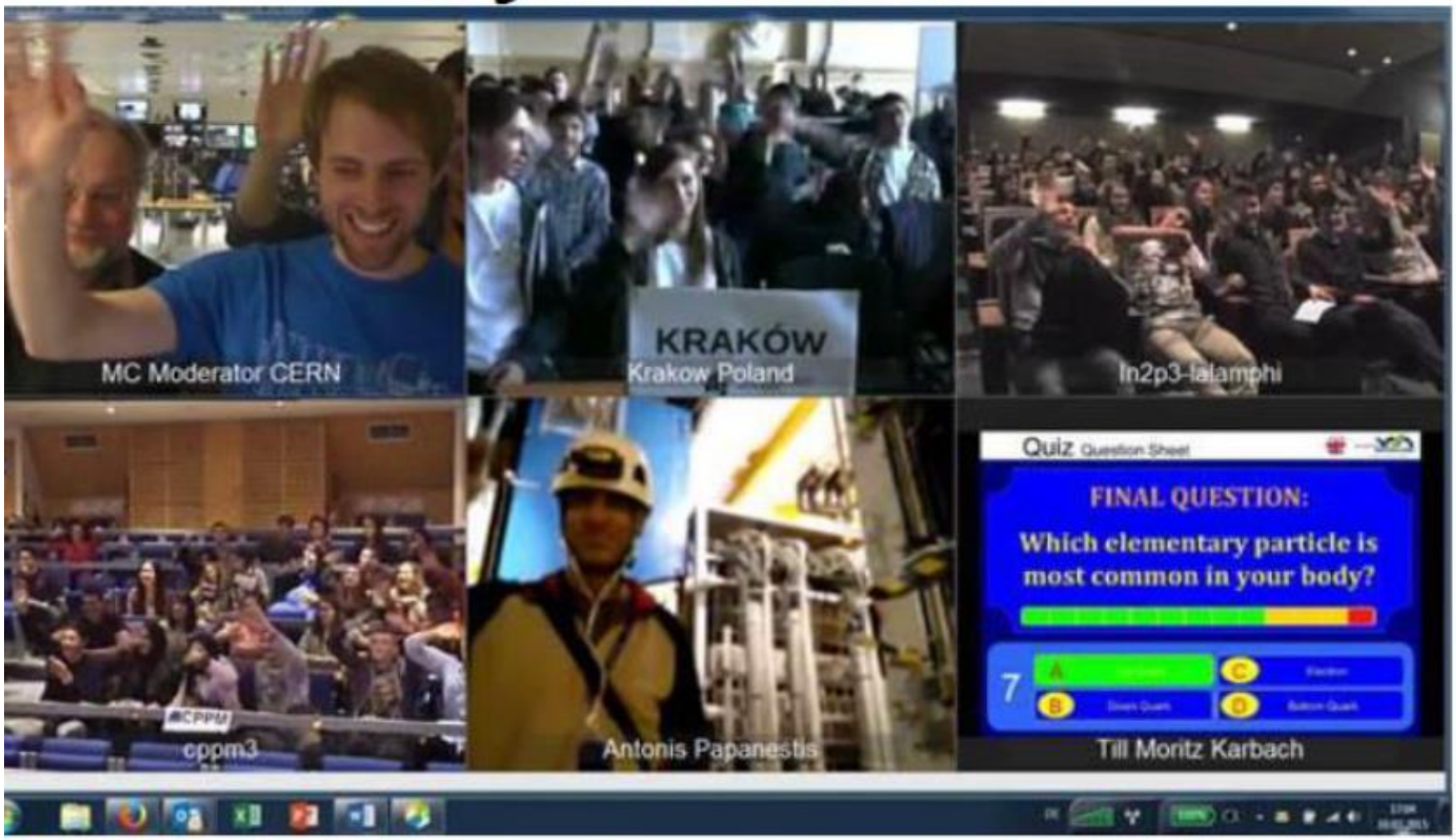
+ Vancouver + vicinity 3 ATLAS MCs this Saturday

+ Australia in July

BUT: Several sessions (~12) cancelled on short notice

But the result is generally fun !

Vidyo conference



Who is centrally organizing masterclasses ?

The International Particle Physics Outreach Group !

http://ippog.web.cern.ch/

Members from CERN member states, from large CERN experiments and from US.
But not (yet) from Japan…..

Even if it looks as a very CERN-centered activity, there are no prejudice at all in extending it to other particle physics experiments and fields.

What should JENNIFER do ?

It is essential to prepare masterclasses excercises for Belle-II and T2K (see next slide)
(first part of the masterclass day is invariant: basic lectures on particle physics and detectors)

We can independently organize one T2K and one Bell-II masterclass day in our institutions, setting up also a video connection with KEK and JPARC.
(Time zone may be a problem: either connection is organized in european morning, either moderators in Japan will operate during night)

We should discuss with IPPOG whether this program can be included and coordinated with the CERN masterclasses. A japanese member of IPPOG would be of great help.

If there is interest in the japanese community we can support implementation also with japanese students. Joint european and japanese events would be perfectly in the JENNIFER mission.

How to setup masterclasses exercise ?

The use of real data from experiments is very important: until Belle-II will not be running, Belle data can be used (CERN has been using LEP events until 2012…)

It is very important to select a physics channel not too complicated, but also very interesting. Also, where not a huge statistics is needed to see something, as students analyze events one by one (i.e. time dependend asymmetries looks hard to implement).

A good visual analysis program has to be setup. It can be obtained from standard experiment event display, with some added features. Need to discuss it with software experts.

Conclusions

Participation to masterclasses is a very important outreach opportunity for Belle-II and T2K communities.

Again, need people willing to work on the exercise selection and preparation !

Some political support with IPPOG is essential to include such activity in the existing masterclasses program.

However, if necessary, we can do our independent masterclasse events.