LHCb Masterclass days

V. Gligorov, CERN

For the Masterclass team

International Masterclass Steering Group Meeting

15th May 2014

Overview

12.03. - 15.03.	17.03. - 22.03.	24.03. - 29.03.	01.04. - 05.04.	07.04. - 11.04.	
	Mon, March 10	Tue, March 11	Wed, March 12	Thu, March 13	Fri, March 14	Sat, March 15
topic			VC 1: ATLAS Z	VC 1: ATLAS W	VC 1: ATLAS Z	VC 1: ATLAS W
			Vila Real	Krakow	Innsbruck	Lisboa FCUL
			Pisa	Bragança	Pisa	Bucharest
			Graz	Göttingen	Oslo	Coimbra
			Thessaloniki		Udine	Porto
			U. California Riverside		Copenhagen	
topic			VC 2: CMS	VC 2: CMS	VC 2: ALICE	
			Jerusalem	Athens, Demokritos	Frascati	
			Firenze	Palaiseau	Prague CTU	
			Mons	Roma Sapienza	Curitiba	
			Debrecen	Santander		
				Bologna		
topic			VC 3: LHCb			
			Cincinnati			
			Cambridge MIT			
			Syracuse			

International Particle Physics Outreach Group

International Masterclasses – hands on particle physics

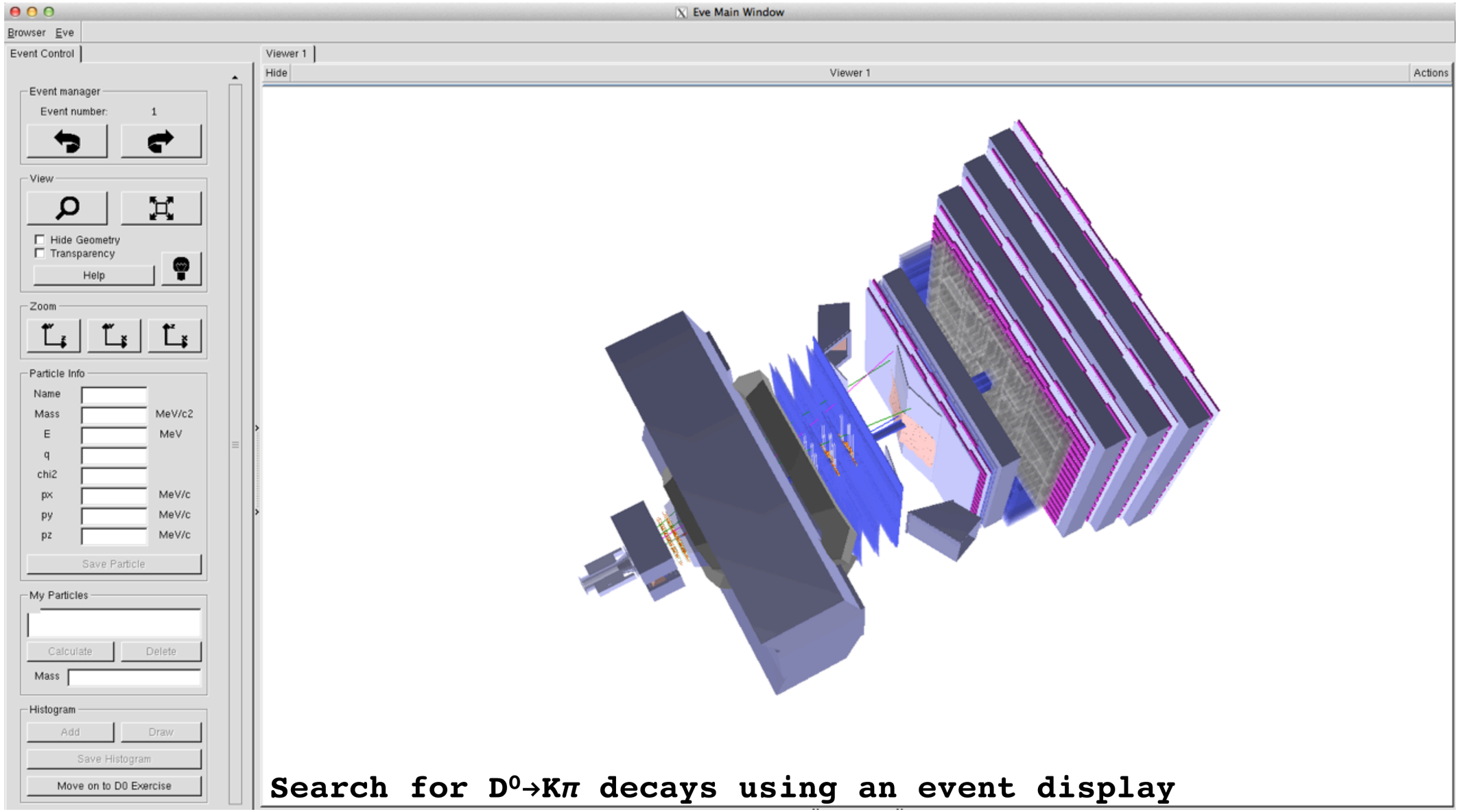
INTERNATIONAL MASTERCLASSES

hands on particle physics

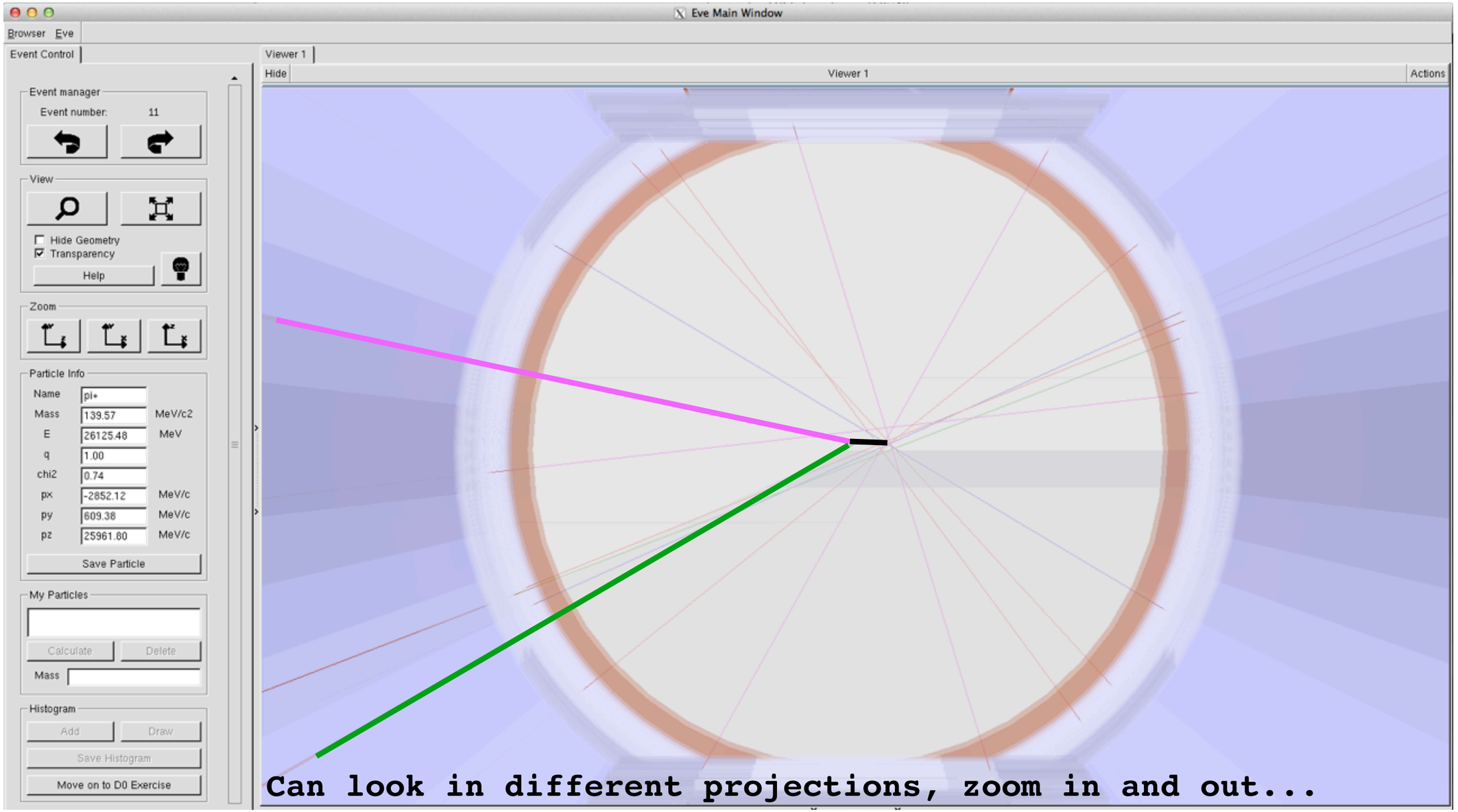
This talk will be an overview of our first time in the International Masterclasses

Before I begin, a big thank you to the IM steering group for your support and encouragement with this project!

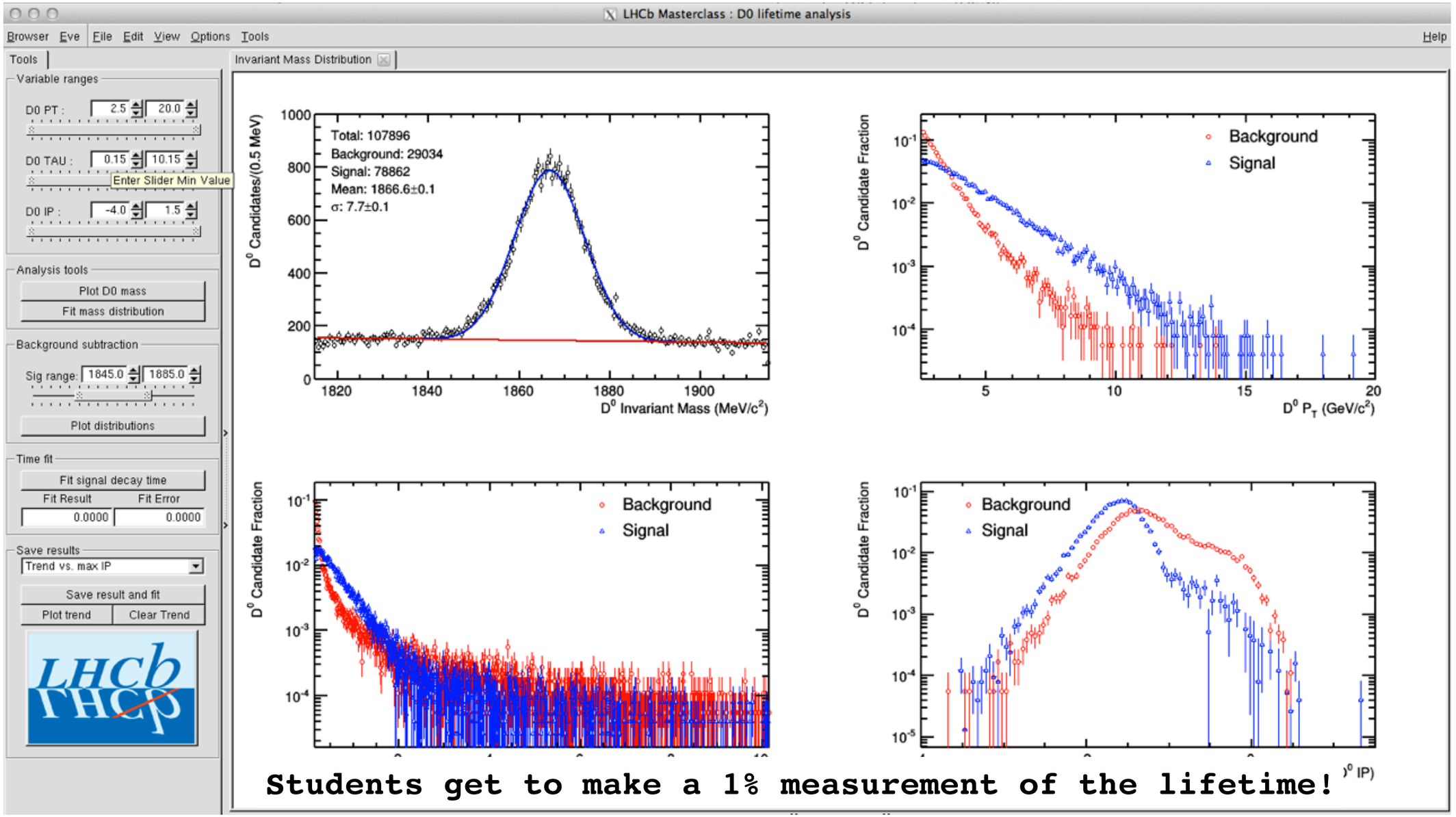
The exercise itself



Finding D^0 mesons



And measuring their lifetime



Students get to make a 1% measurement of the lifetime!

lhcb-public.web.cern.ch/lhcb-public/en/LHCb-outreach/masterclasses/en/Schedule.html

LHCb@InternationalMasterclasses 2014 Schedule

- March 12th : Cincinnati, MIT, Syracuse
- March 17th : Ferrara, Marseille, Pisa
- March 25th : LAL Orsay, Warwick, Milano
- March 26th : Padova, Firenze, Edinburgh
- March 28th : Suceava, Bologna, Clermont
- April 1st : Marseille, NIKHEF, CERN (a school from Geneva)
- April 3rd : Dortmund, LPNHE Paris, Bucharest

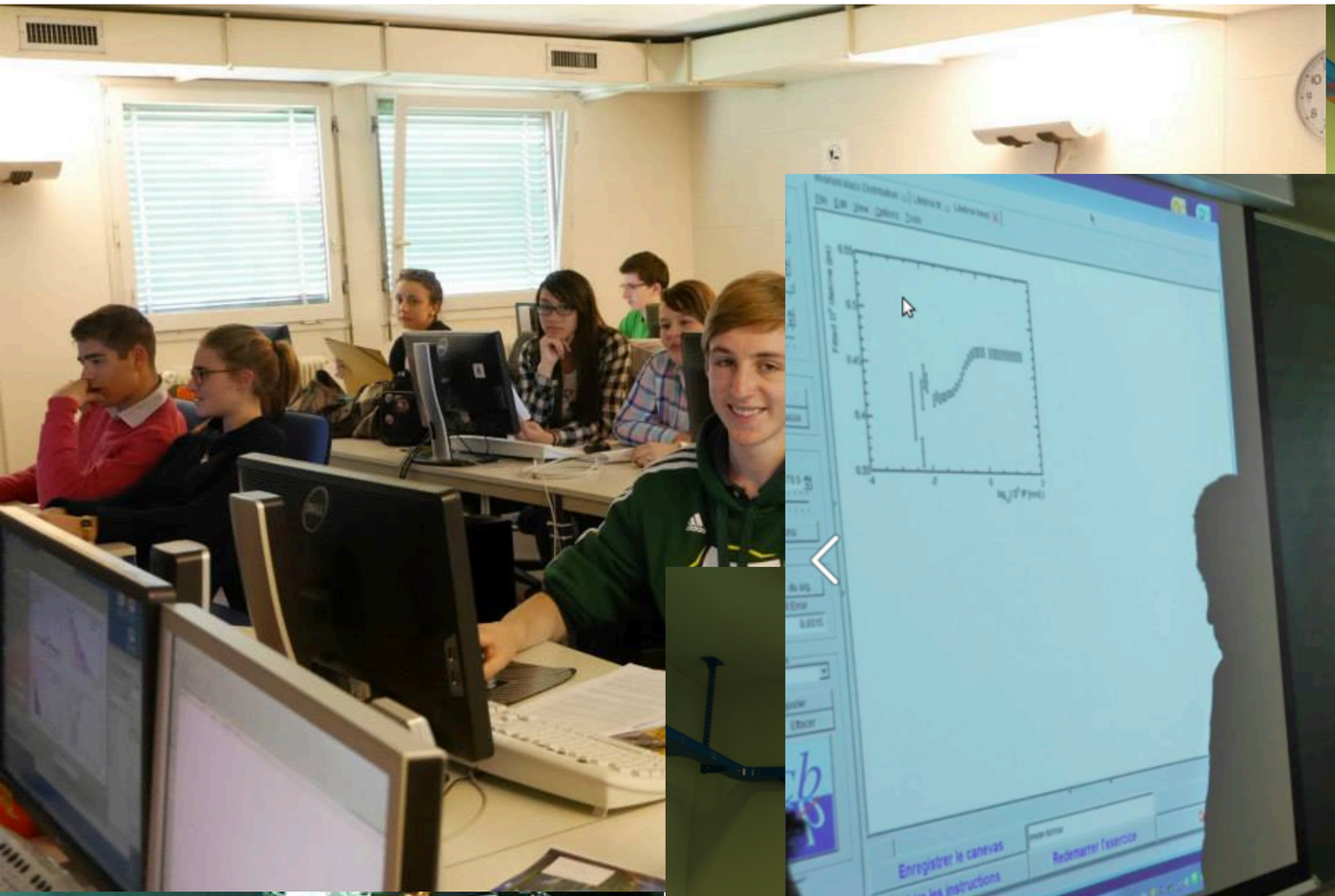
Participating Institutes

Bologna, LOCAL INFORMATIONS
BUCHAREST, LOCAL INFORMATIONS
Bucharest
CERN
Cincinnati
CLERMONT
Dortmund, LOCAL INFORMATIONS
Edinburgh
Ferrara
FIRENZE, LOCAL INFORMATIONS
Marseille, LOCAL INFORMATIONS
MILANO, LOCAL INFORMATIONS
NIKHEF
LAL Orsay
MIT
PADOVA, LOCAL INFORMATIONS
LPNHE Paris
PISA
SUCEAVA, LOCAL INFORMATIONS
Syracuse
Warwick

The kids in action

Cincinnati, MIT, Syracuse
Ferrara, Marseille, Pisa
LAL Orsay, Warwick, Milano
Padova, Firenze, Edinburgh
Suceava, Bologna, Clermont
Marseille, NIKHEF, CERN (a school from Geneva)
Dortmund, LPNHE Paris, Bucharest

Even I got photographed



Cincinnati, MIT, Syracuse
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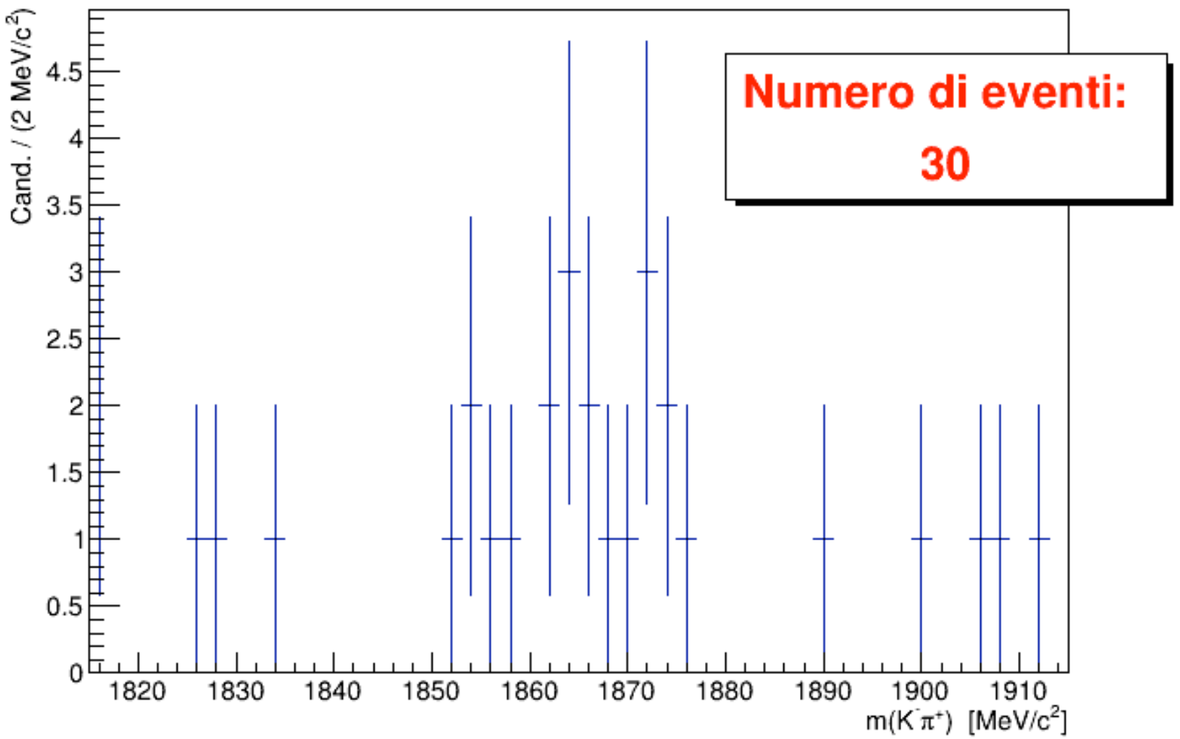
First serious point

None of the groups managed to obtain consent for the students to be videorecorded => we will try again next year but it is far from trivial.

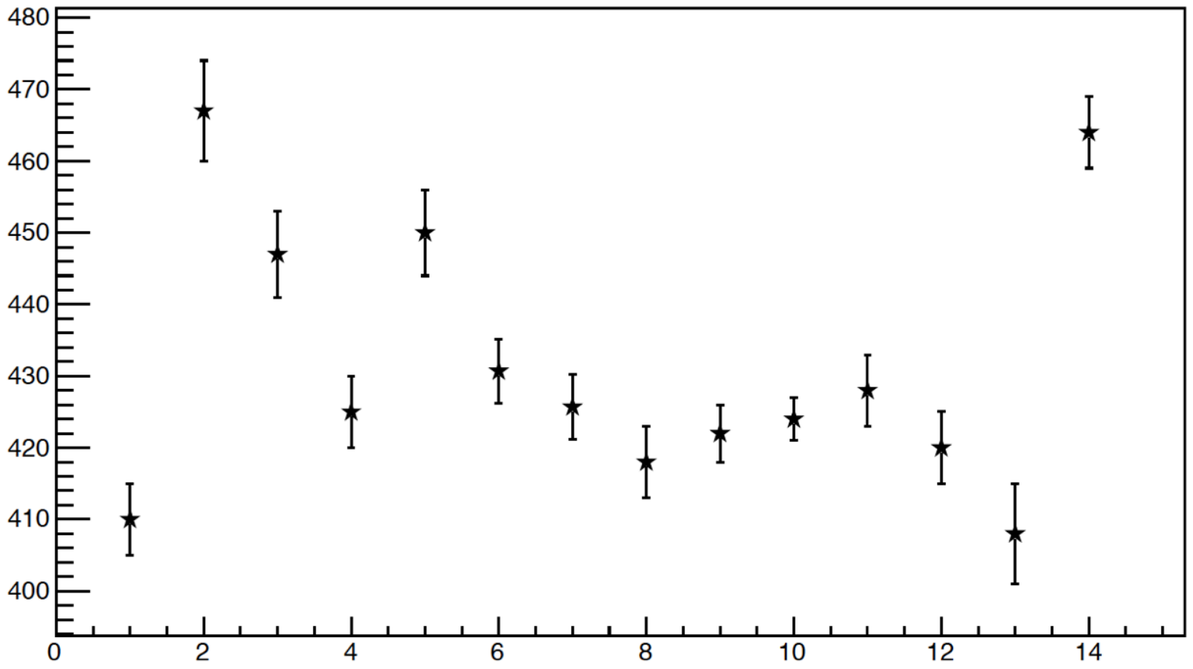
Would appreciate advice from the more experienced members of the IM steering group on how this is usually handled. We did ask well in advance but there was little enthusiasm for jumping through the legal hoops.

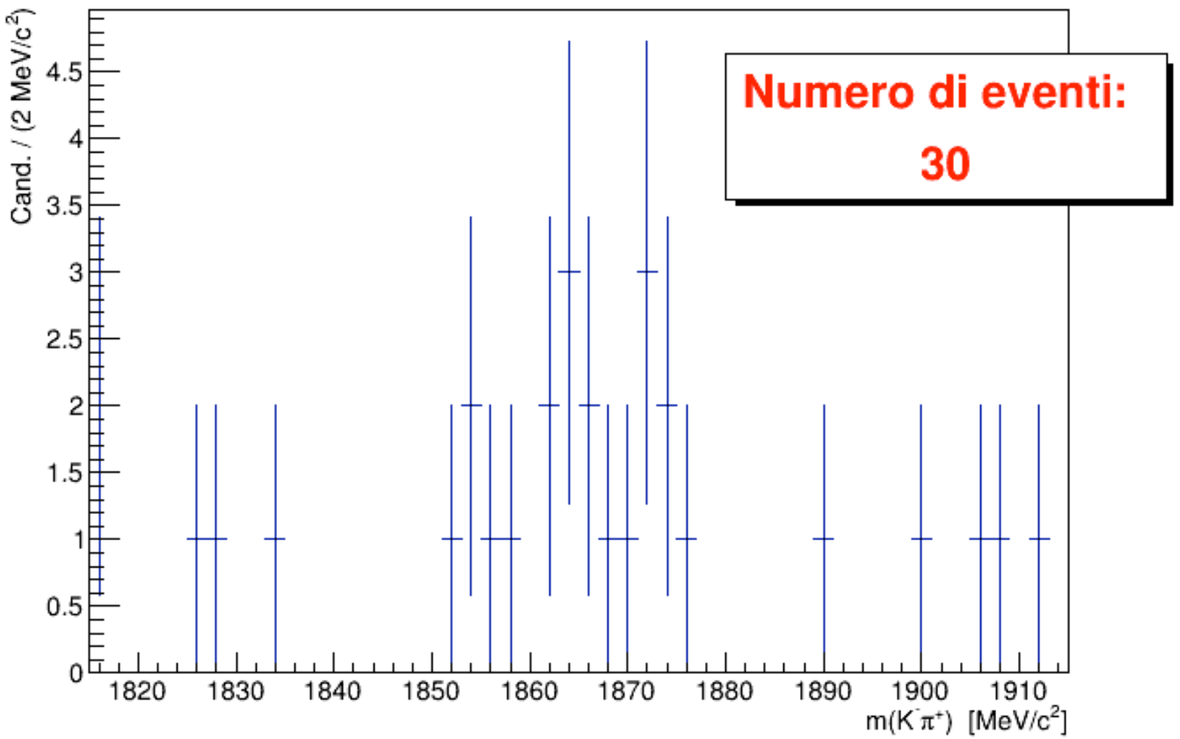
Combining student's results



For the mass plot, the participating groups put together a script to make an animated gif of the particles found by the students : watch the peak appear!

Combining student's results

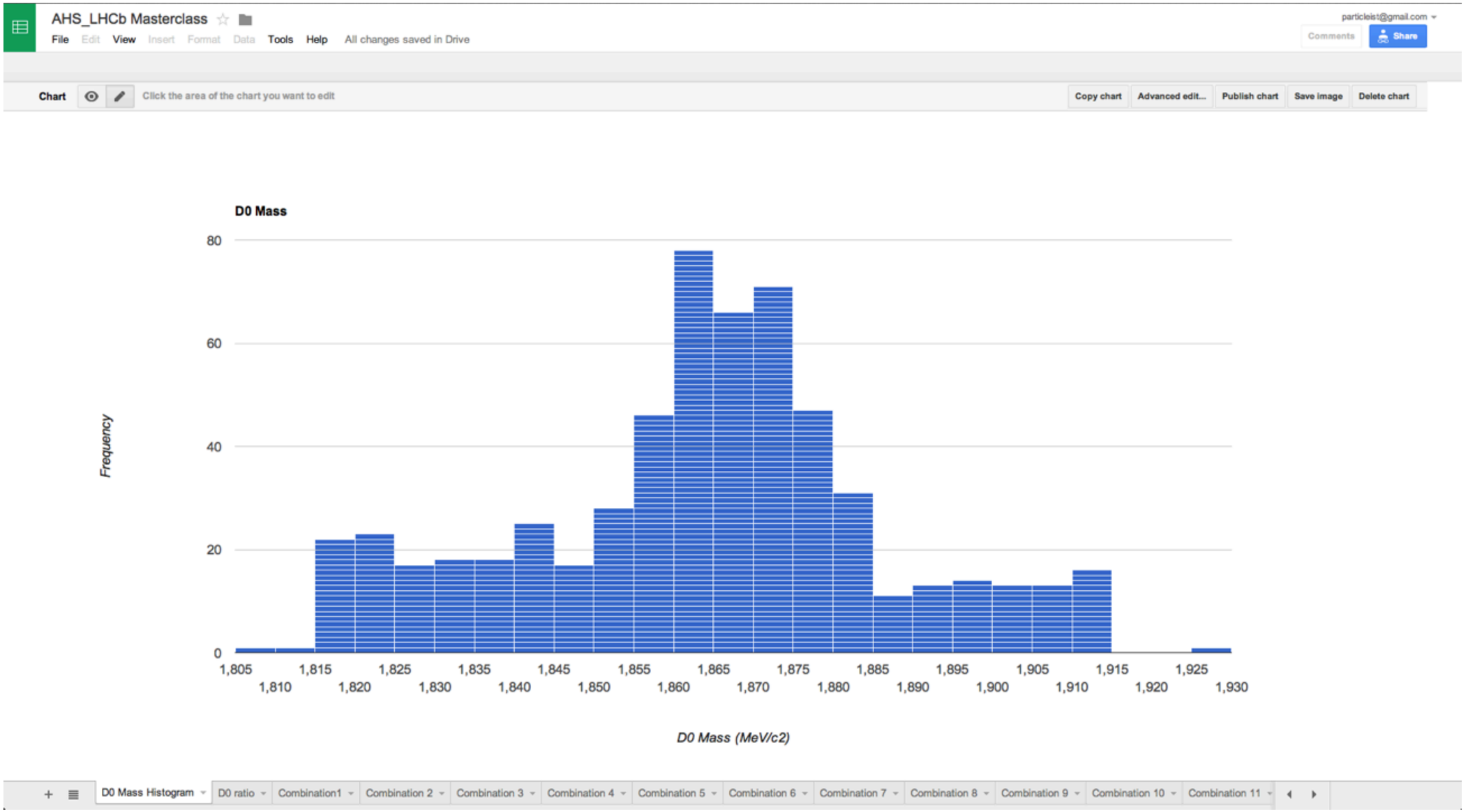




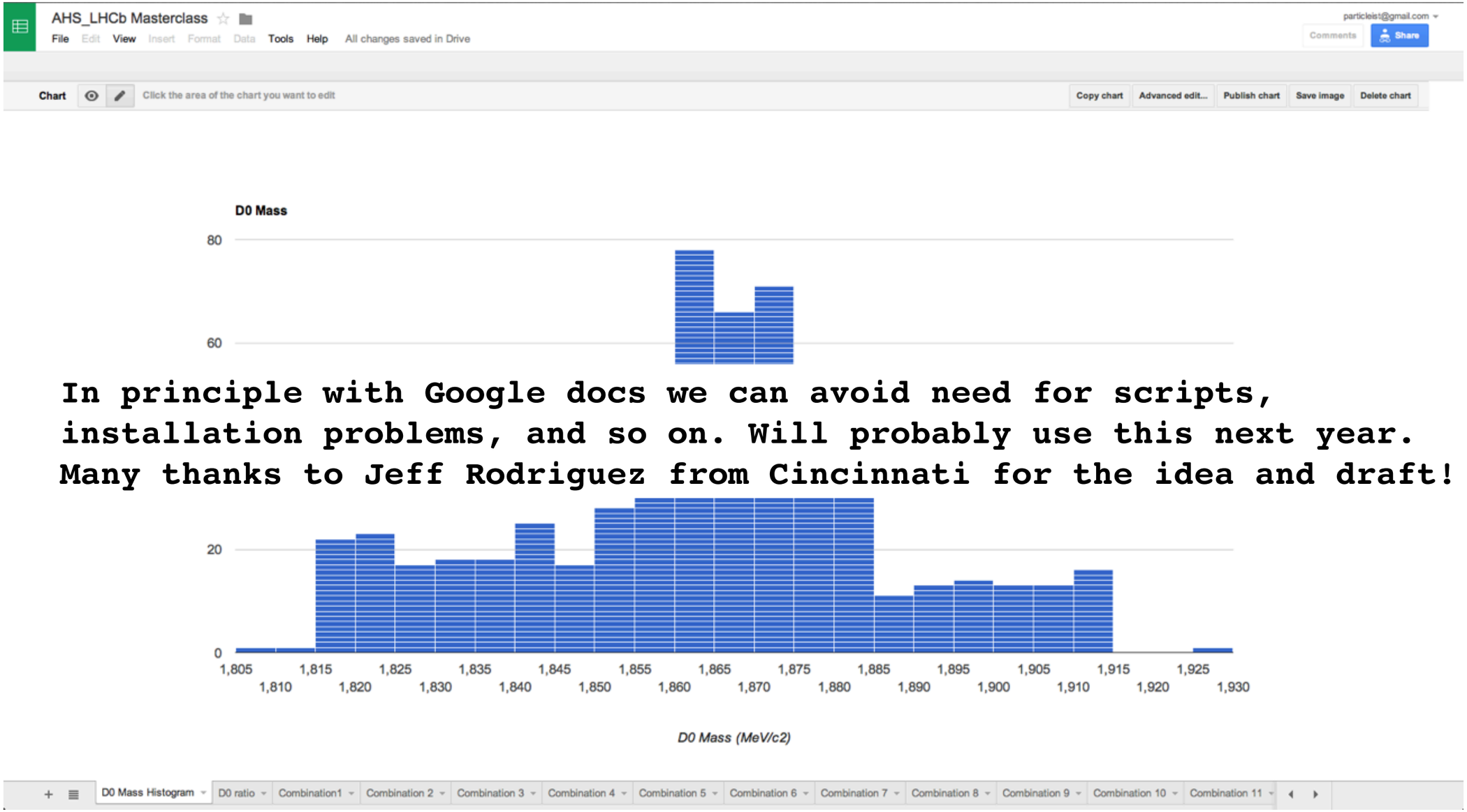
For the mass plot, the participating groups put together a script to make an animated gif of the particles found by the students : watch the peak appear!

For the time results, everyone gets the same dataset, so not much to combine, but can compare the results of the different students.

An idea for next year

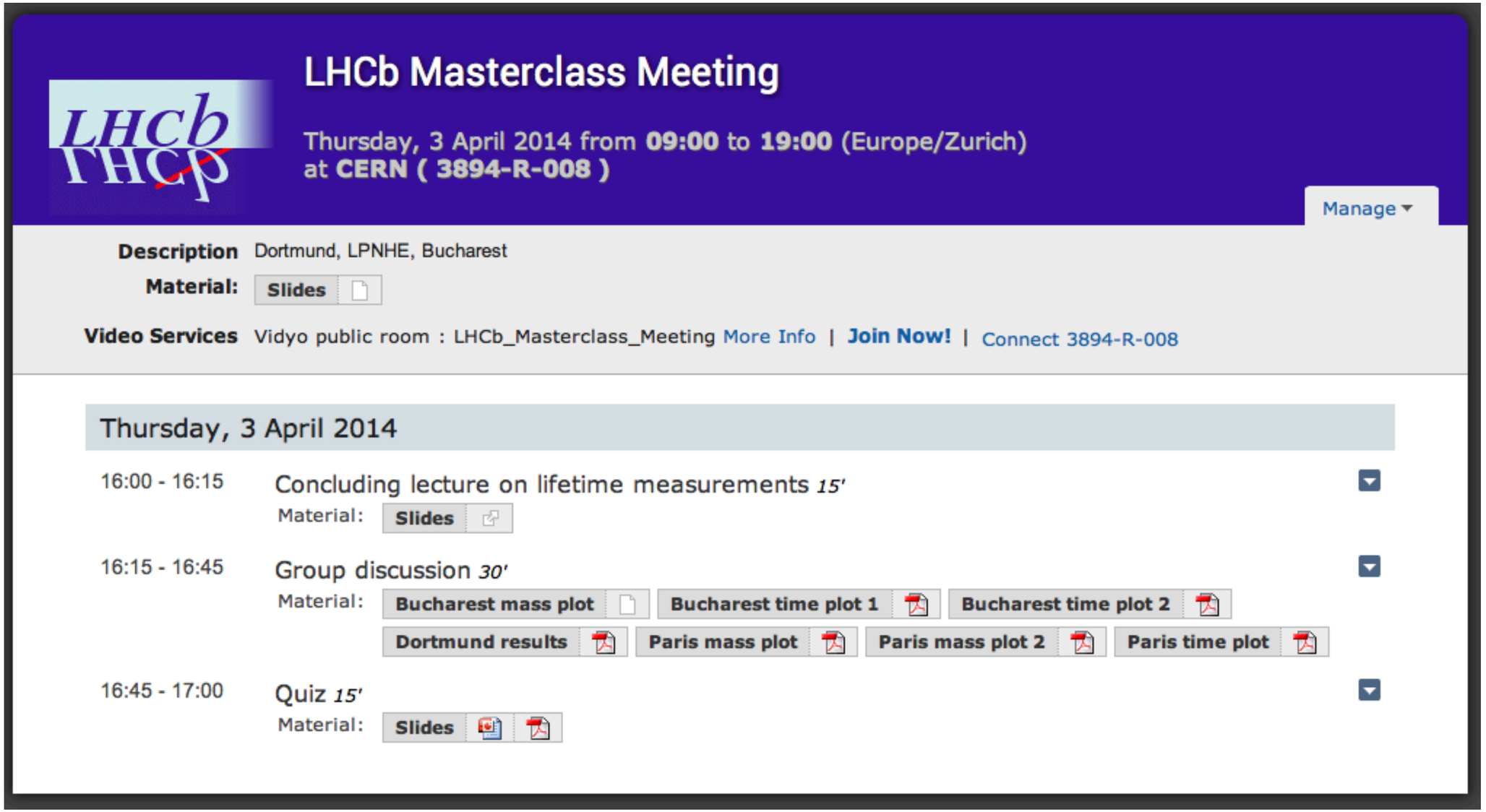


An idea for next year



In principle with Google docs we can avoid need for scripts, installation problems, and so on. Will probably use this next year. Many thanks to Jeff Rodriguez from Cincinnati for the idea and draft!

Structure of the videoconf



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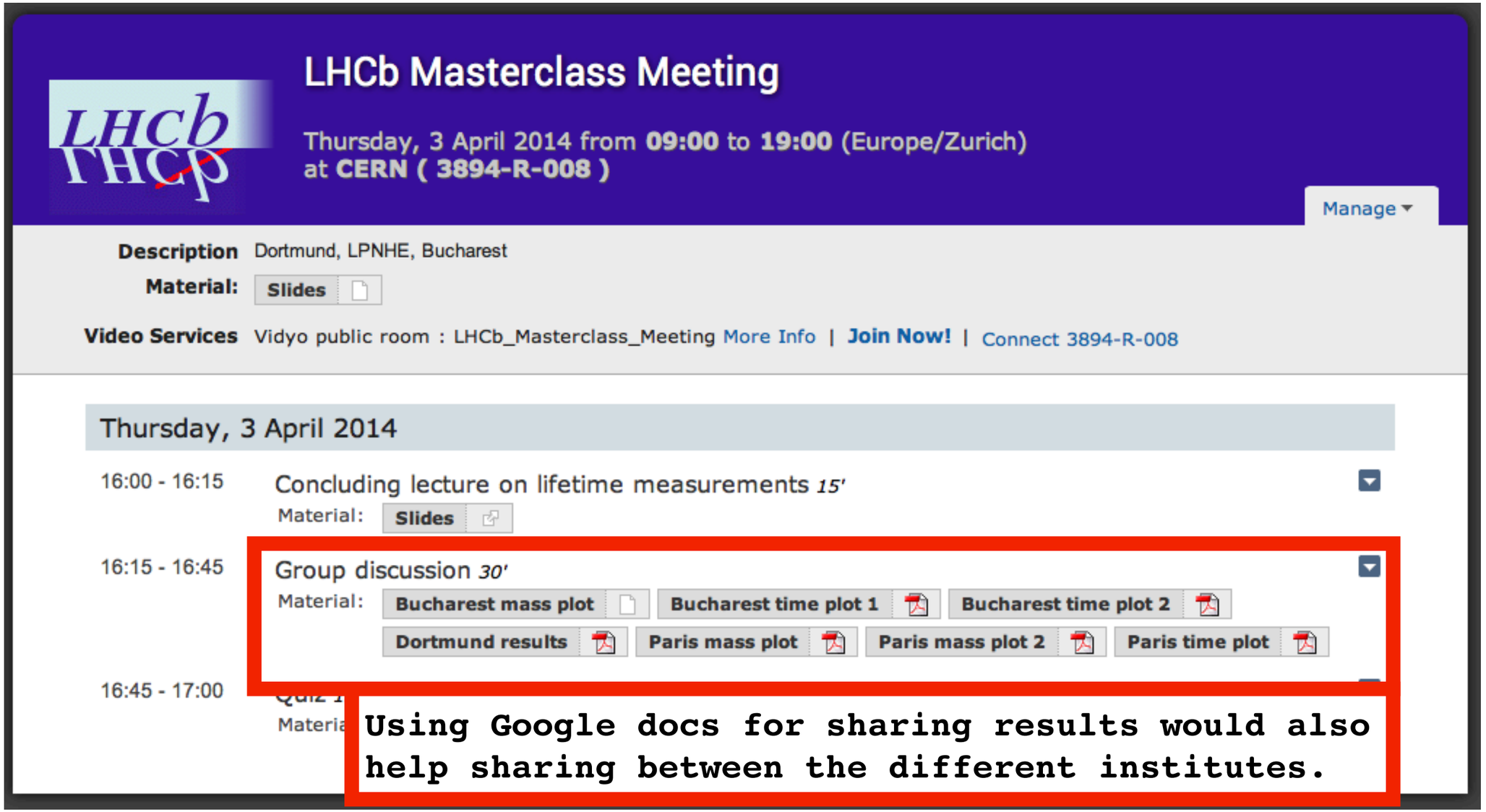


Feedback on videoconf

Some of the groups felt the videoconference was a bit repetitive, with each group reporting back what it found and them all finding similar things

Would have been good to insert an extra 15-20 minute gap between the exercise ending and the start of the videoconf for discussion within the group, but not all groups managed this

We suffered severe Vidyo problems

=> These issues forced the cancellation of the first videoconf, leaving >100 students without a chance to discuss their results.

=> We also had recurring issues with connections dropping and poor audio.

=> This is unacceptable and must be fixed for next year.

Feedback on exercise software

We underestimated how diverse the computing architectures at the different institutes were, and installation was very labour-intensive. Need to see if this can be made easier for next year.

Once installed, however, everything was quite smooth. Some bug reports and feature requests have been received and will be implemented for next time. In particular, there were a few events which caused reproducible crashes in one lab, which are under active investigation.

Feedback on exercise content

Feedback was generally good (but see next slide)

Majority of received criticism was that the exercise was too simple. The students and teachers would have wanted trickier things e.g.

=> Allow students to look for CP violation or D0 oscillations by using the observed particle charges to split the sample into D0/D0bar decays

=> Bring back event selection tuning to the second half of the exercise

Neither is easy to implement in the time available in the masterclass schedule, but I take encouragement from the fact that people want to dig deeper with the exercise!

Feedback on exercise content (2)

The one place we got negative feedback from was the school from Annecy who did their masterclass at CERN. The students found the exercise too hard.

I ran the exercise that day and my personal observations were

1) **The teachers had done no preparation with the students whatsoever (in contrast to all other schools). Many of the students didn't even know what momentum was, much less anything else.**

2) **The teachers showed no interest during the day and refused to actually do the exercise together with their students.**

It is clear that this exercise is a bit more complex than just bump hunting, and it does need some preparation on the part of the schools and some engagement on the part of the teachers. The Annecy school was unique of the 21 participating schools in that neither happened.

In the future we should clearly communicate to all the schools that they must do at least some preparation in advance with the kids.

Feedback on exercise content (3)

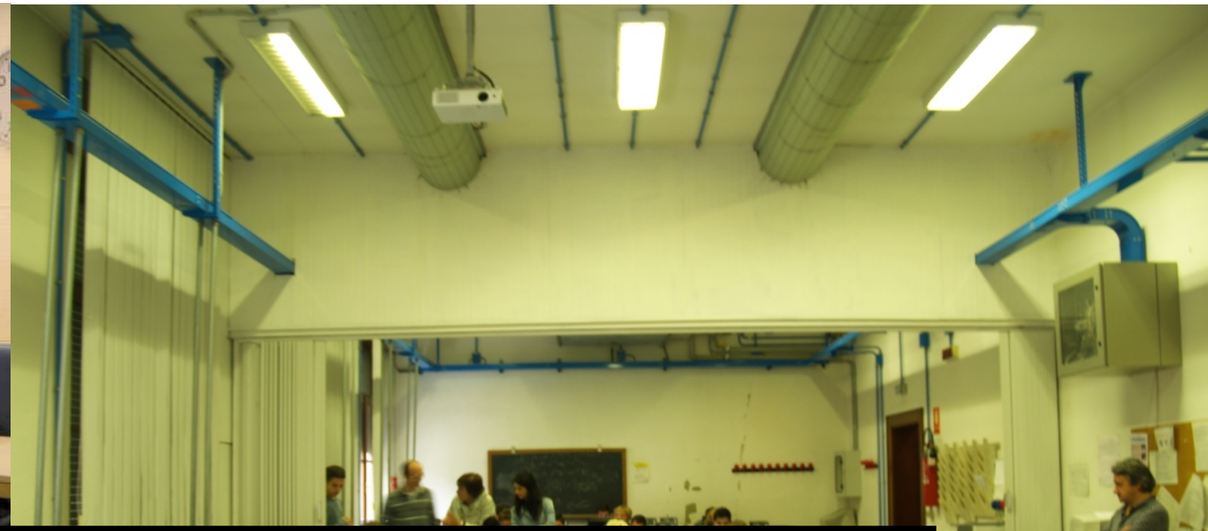
We also got feedback from a teachers' conference in the US where this exercise was presented (Southern Ohio section of the AAPT meeting)

=> They expressed interest in turning this into a module physics majors

=> Goes in a similar direction to suggestions and expressions of interest received from some UK institutes

For next year we will try to diversify the exercise into "simpler" and "harder" versions, so it can be used across a range of student ages

Conclusions



First LHCb masterclass was a big success! Lessons to be learned for next year, but the reception has been overwhelmingly positive.

Thank you all for your support once again!

Cincinnati, MIT, Syracuse
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