

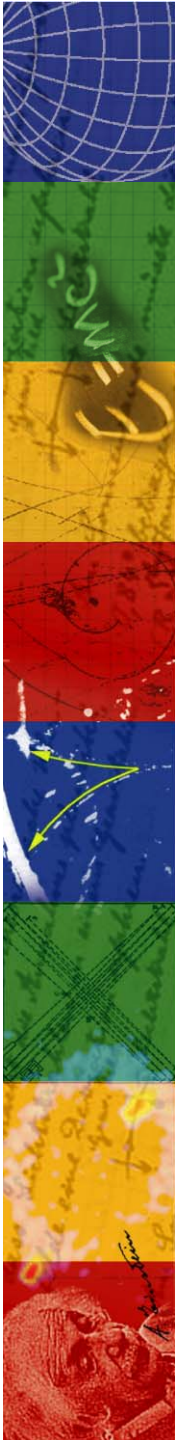
“Hands on Particle Physics” International Masterclasses

The Masterclasses in North America, Winter-Spring 2007

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Lawrence Berkeley
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“Hands on Particle Physics” International Masterclasses

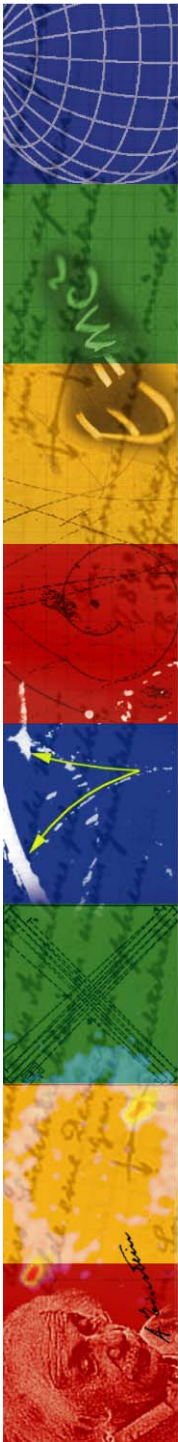
MEMO

TO: Indiana Data Analysis Team

FROM: Virtual LHC Center

RE: Identification of Z-bosons in ATLAS and
CMS data from the Large Hadron Collider
first run, scheduled to start November 2007
[make that July 2008]

DATE: 15 March 2007



Previous work by Long Island Data Group, 2006



The Ward-Melville High School particle physics analysis group works on LEP data in Mrs. Entwistle's classroom.



A screenshot of the EPPOG Masterclass videoconference. Clockwise from top left are the Ward Melville group at Brookhaven, students in Poland, students in Greece, and the conference leaders at CERN.

"Hands on Particle Physics"
International Masterclasses

- Six students and a teacher from Ward Melville High School, Setauket NY
- Analyzed DELPHI data
- Compared with results in videocon with CERN and student groups from Poland, Greece, Slovakia
- Good results: more data analysis needed in 2007

What will happen in the videoconference

- You will give your branching ratios
- Groups from Germany, Greece, Portugal, and the US will compare data
- Discussion of results – have good questions and comments ready!
- CERN Moderator: Dave Barney, CMS Physicist
- Masterclass “Fun” Quiz



←A section of the LHC

Dr. Barney →



Masterclass in North America and beyond



Student Masterclasses:

- Notre Dame
- Cincinatti
- Tallahassee (FSU)
- Brookhaven
- Baltimore (JHU)
- Richmond (no videocon)

Teacher Masterclass:

- Fermilab

Not exactly in N. America:

- Johannesburg (Wits)

Unique to QuarkNet

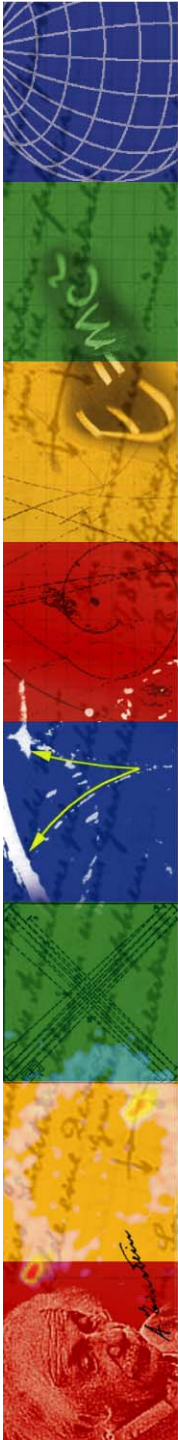


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Calendar	Feature
<p>Fri., March 30 8:30 a.m. Presentations to the Physics Advisory Committee - Curia II Agenda 3:30 p.m. DIRECTOR'S COFFEE BREAK - 2nd Flr X-Over 4:00 p.m. Joint Experimental-Theoretical Physics Seminar - 1 West Speaker: K. Terashi, Rockefeller University Title: Diffraction and Exclusive Production at CDF: Towards Exclusive Higgs at LHC ~</p> <p>Mon., April 2 2:30 p.m. Particle Astrophysics Seminar - Curia II Speaker: S. Perez, Fermilab Title: Warped DGP: Self acceleration, Ghosts and Other Beasts 3:30 p.m. DIRECTOR'S COFFEE</p>	<p>First European Masterclass extends reach of teachers</p>  <p>High school teachers got a crash course in collider physics at Fermilab last weekend, during the first European Masterclass as part of the QuarkNet program.</p> <p>A group of high school teachers from five states and Puerto Rico participated in the first European Masterclass at Fermilab last weekend. Coordinated with the European Particle Physics Outreach Group, the class was offered as part of the QuarkNet program at Fermilab. QuarkNet is an educational program funded by NSF and the DOE Office of Science designed to support science education in high schools by establishing a nationwide teacher network. The goal of the program is to introduce teachers and students to</p>

- QuarkNet-run teacher Masterclass at Fermilab; see article in *Fermilab Today*, 30 March 2007
- Kudos to Dan Karmgard (Notre Dame) and Hector Mendez (Puerto Rico)
- Wiki to guide teachers and mentors
- Kris and Ken travelled to visit most institutes
- Seeking to adapt for a true North American Masterclass

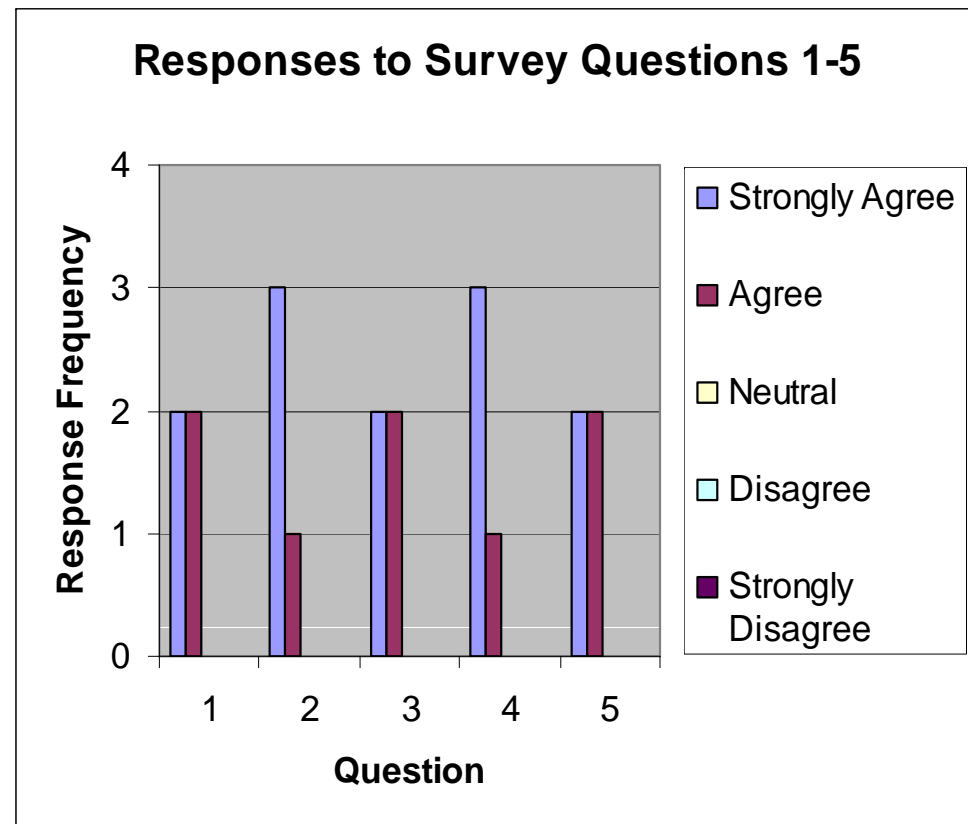


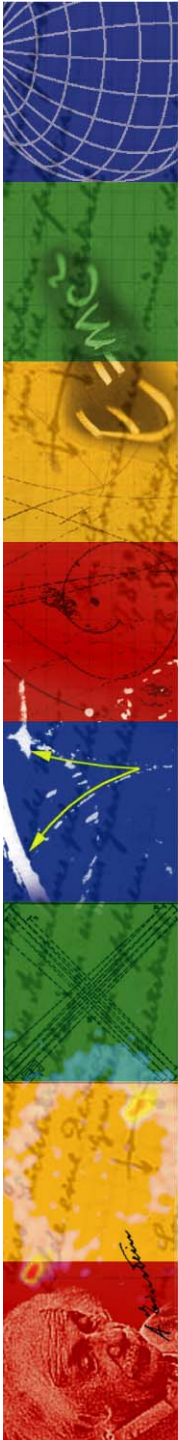


Results of US Teacher Survey

- Survey: 5 positive statements about Masterclass to which teachers respond from “Strongly Agree” to “Strongly Disagree”
- 4 of 7 teachers returned surveys

1. The Masterclass helped my students to better understand how science is done.
2. My students learned interesting particle physics in the Masterclass.
3. My students learned useful things about relatively large datasets.
4. My students enjoyed the Masterclass.
5. The Masterclass increased my students’ interest in physics.

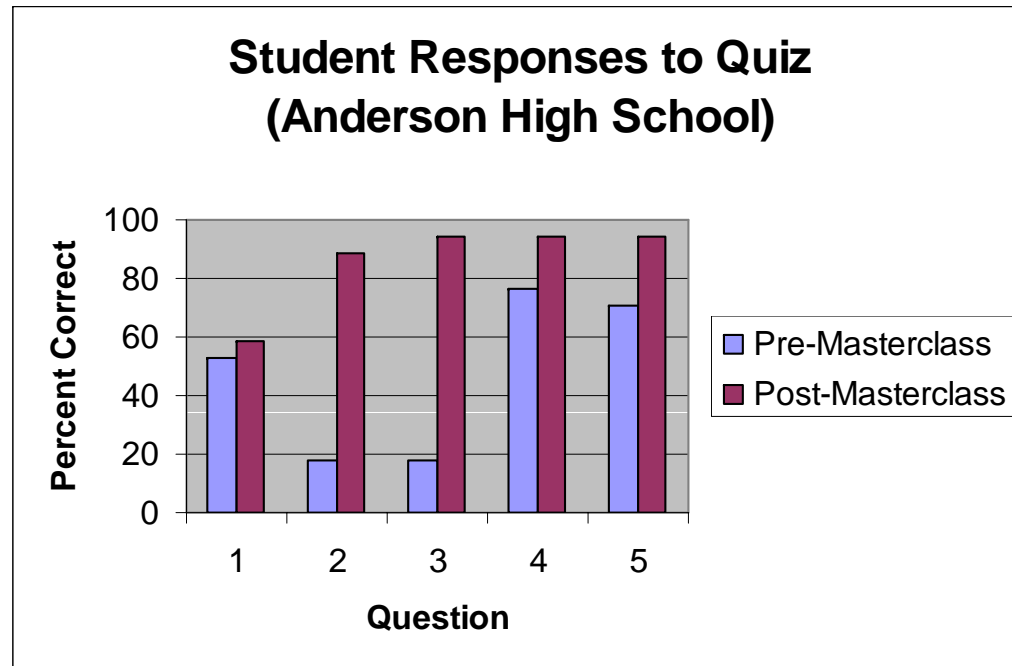


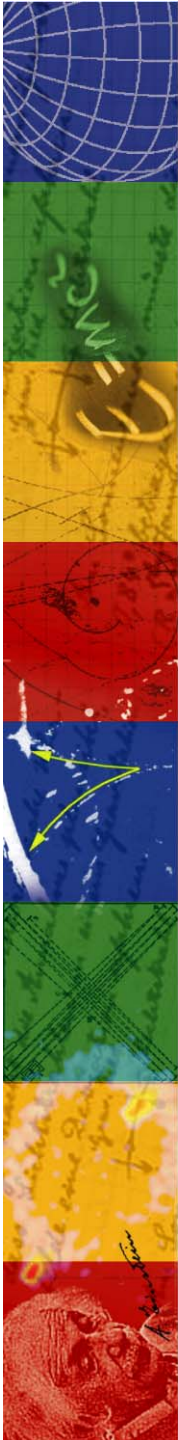


Results of US Student Pre/Post Quiz

- 5 multiple choice questions on quiz
- 1 class of 17 students took the quiz
- Questions not used on Masterclass Quiz

1. Particle mass
2. Particle energy
3. Weak force
4. Experimental statistics
5. Branching ratios





Teacher Comments

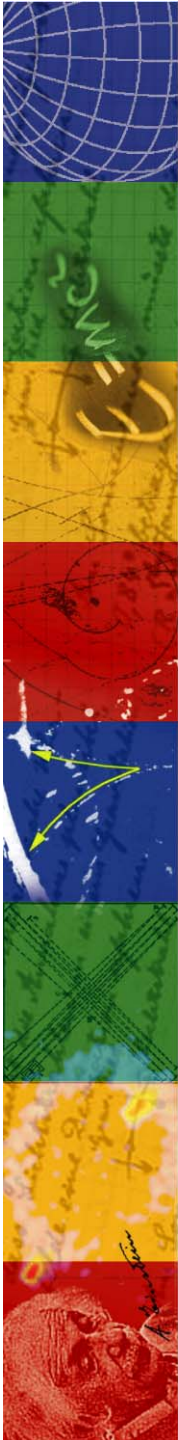
- Reliable videoconference connectivity was an issue
- Wished for more classroom-to-classroom interaction in the videoconference
- Overall: *very* positive experience for teachers and students



Overall Impressions



- QuarkNet Staff, Teachers, Mentors enthusiastic
- New ideas were generated (online course on LHC, fiery union of Masterclass and e-Lab, etc)
- Students had a great time...Silvia was shocked at the raw enthusiasm of the Cincinatti group
- Videoconference is a great motivator and capstone to the Masterclass
- Let's do it again!



What's Down the Road?

First North American Masterclass: Fall 2007?

- LEP-based
- QuarkNet Teacher Fellows develop LHC “wrapper” and explore new ways to enhance inquiry basis
- Participants outside NA invited (limited numbers)
- Moderated from a US site

Beyond...

- LHC-based Masterclasses
- Span the globe!



Online References

- US Masterclass wiki:
<http://cosm.hamptonu.edu/wiki/doku.php?id=wiki:user:kence:masterclass2007>
- Anderson High School Masterclass wiki:
<http://ahscincy.pbwiki.com/2007%20Physics%20Masterclass>
- Article in Fermilab Today:
http://www.fnal.gov/pub/today/archive_2007/today07-03-30.html

