



“Hands on Particle Physics” International Masterclasses

The CMS Masterclass for 2011

and connections to the CMS e-Lab

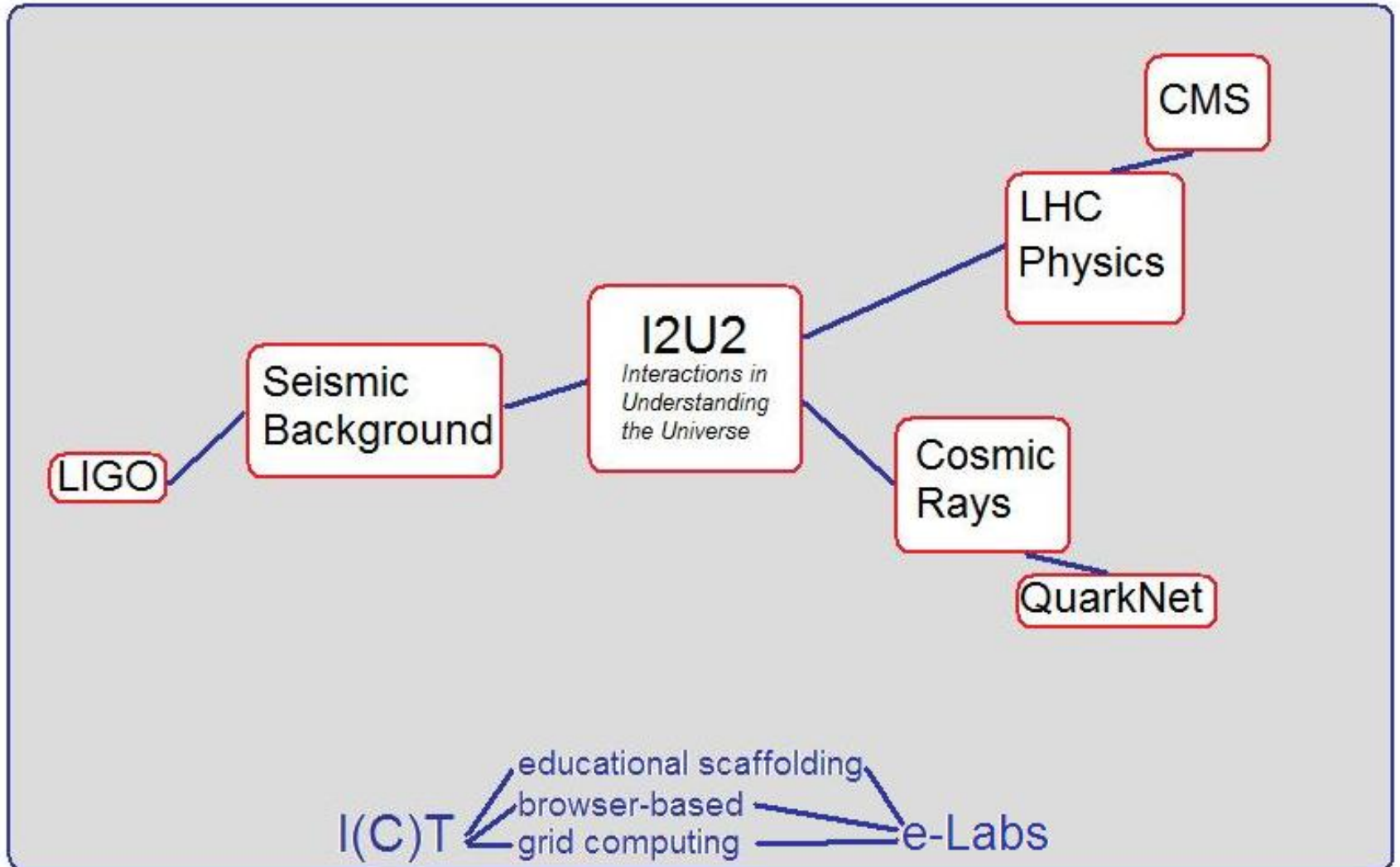
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I2U2 Reference Frame

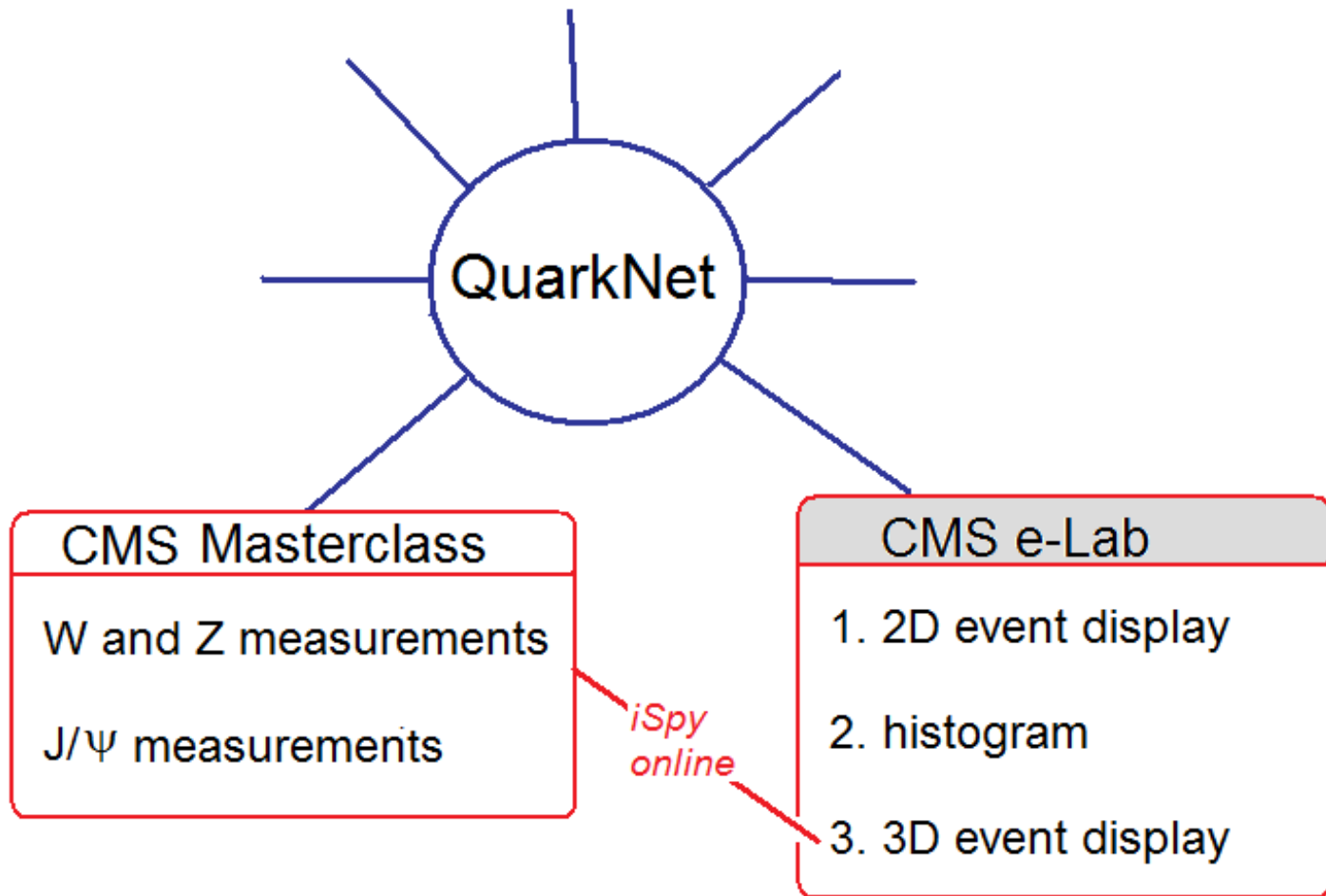
October 2010



QuarkNet Reference Frame

October 2010

*professional development for H.S. teachers of physics
550 teachers in 52 active centers in U.S.*



CMS e-Lab and the Masterclass

- 1 Common event display
- Some similar data
- Collaborative efforts

interpret data

Milestone: : Interpret data.

Scientists often represent their data graphically . .

You have already learned about particles that interact with the CMS detector. Physicists call the interaction an event. Physicists look at these events in data displays either as single or multiple events. Each approach yields important information. The plots below represent the two approaches. Click the plots to learn more about each approach.

Approach 1:
[Single Event Displays](#)
Single event displays are a great way to take a look at what

CMS e-Lab

Project Map Lib
Text Version

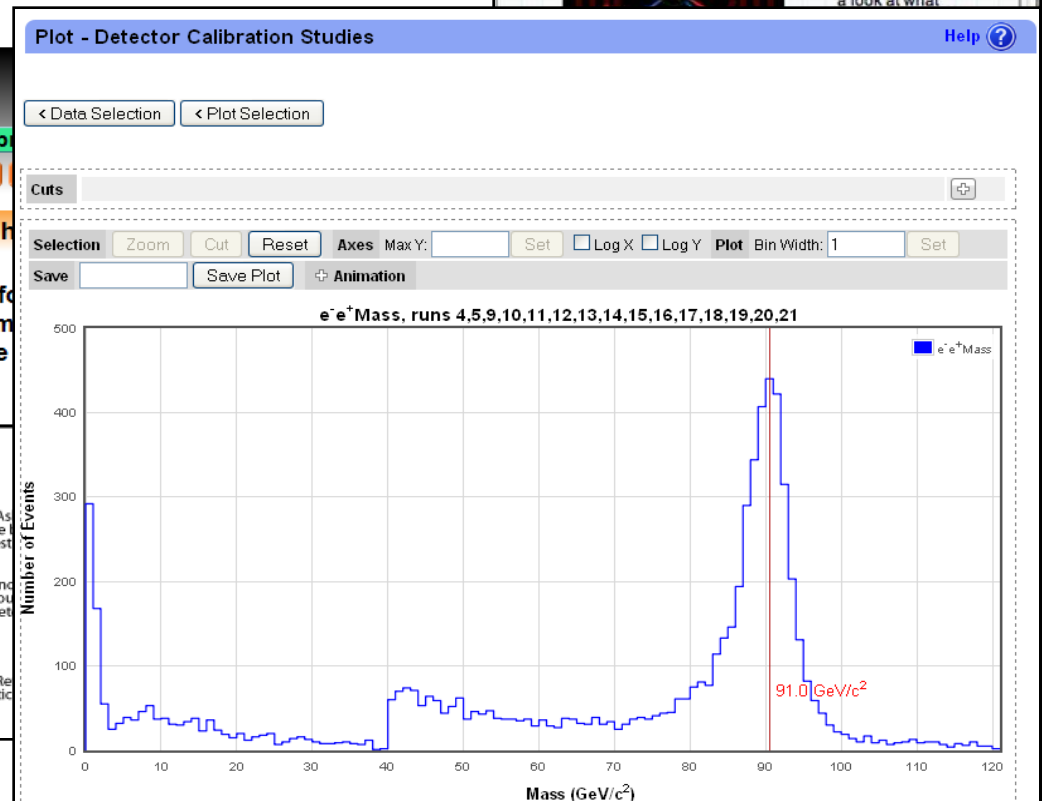
Home: Join a national collaboration of h

Project Map: To navigate the CMS e-Lab, fo
spot to preview; click to open. Along the m
your work is going. Project milestones are

Pre-test Cool Science The Basics (Optional)

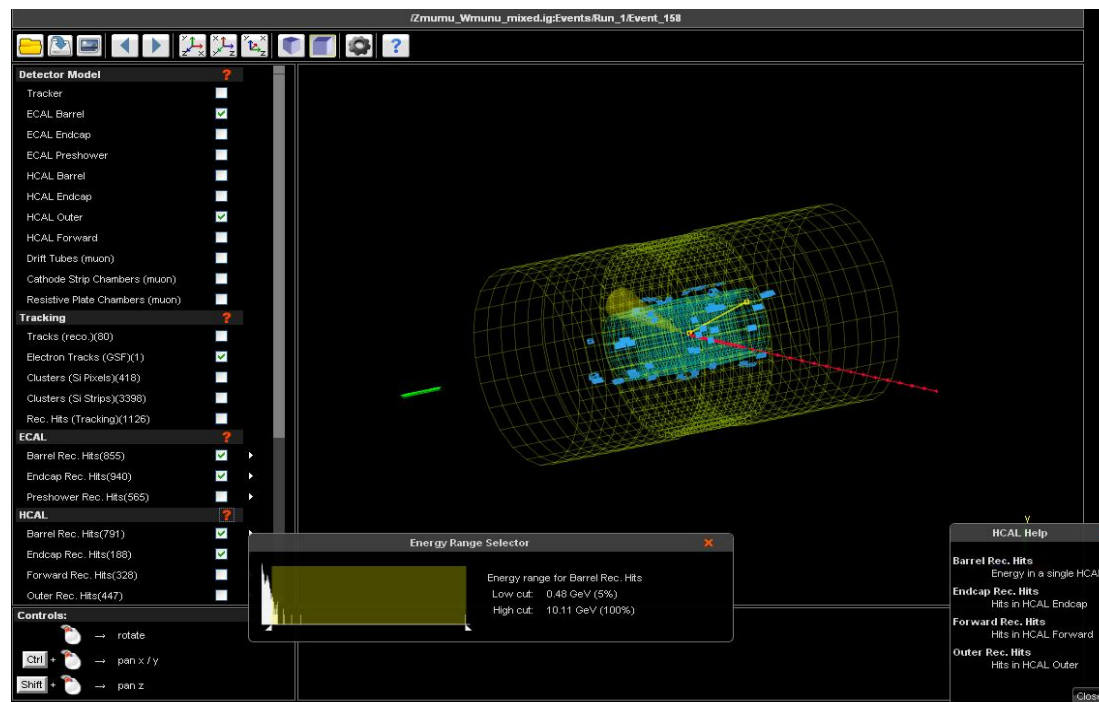
Legend
● Milestone Seminar
● Milestone

Measurement Research Plan
Calculations Research Question
Plots/Graphs (Scatter Plots)



Event Display

- Based on iSpy, runs online
- Javascript by I2U2 programmer Mihael Hategan
- 3D, rotates, zooms, options, more
- <http://www12.i2u2.org/elab/cms/event-display/>



CMS 3D Event Display Screencast

Data

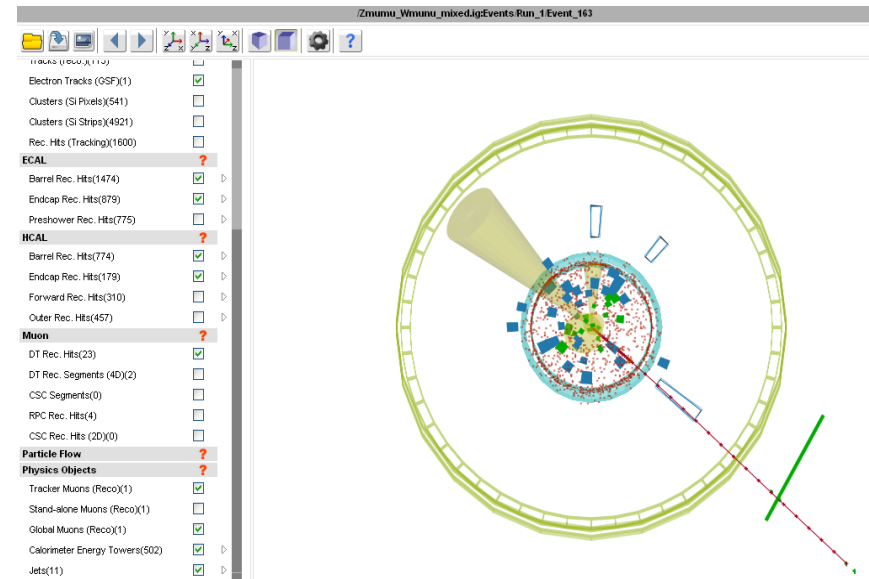
W and Z path

- Students find
 - W/Z
 - W⁺/W⁻
 - e/ μ (not yet, though)

- Await real CMS data
- Test with Monte Carlo provided by ND graduate student Jamie Antonelli

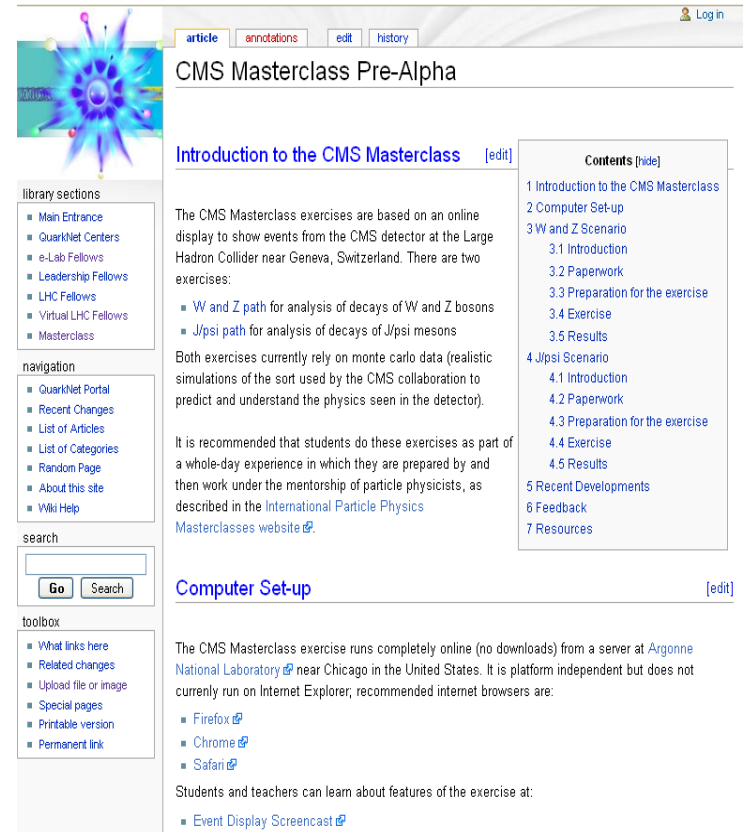
J/ ψ path

- Students find e/ μ /jets
- *Paths subject to change*
- *How can we use all that background?*



U.S. Masterclass – CMS for 2011

- Offer either W-Z or J/ ψ depending on which is most ready
- Classroom prep
- Masterclass day
- Modifications for CMS
- Updates to U.S. model
- CD? New web page? Twiki?



The screenshot shows the CMS Masterclass Pre-Alpha website. At the top, there are tabs for 'article', 'annotations', 'edit', and 'history', along with a 'Log in' link. The main title is 'CMS Masterclass Pre-Alpha'. Below this, there is a section for 'Introduction to the CMS Masterclass' with an '[edit]' link. The main content area contains text about the exercises being based on an online display of CMS detector events, with two exercise paths: 'W and Z path' and 'J/psi path'. It also mentions that exercises currently rely on Monte Carlo data. A sidebar on the right contains a 'Contents' table of contents with links to various sections like 'Introduction to the CMS Masterclass', 'Computer Set-up', 'W and Z Scenario', etc. On the left side of the page, there are several utility sections: 'library sections' with links to 'Main Entrance', 'QuarkNet Centers', etc.; 'navigation' with links to 'QuarkNet Portal', 'Recent Changes', etc.; a 'search' box with 'Go' and 'Search' buttons; and a 'toolbox' with links for 'What links here', 'Related changes', etc.

Collaborators

I2U2

- Tom Loughran (ND)
- Mihael Hategan (UC Davis)

Fermilab

- Marge Bardeen
- Liz Quigg

NDeRC

- Jamie Antonelli (ND)

QuarkNet

- Mike Fetsko (Mills Godwin HS)
- Dave Trapp (Sequim Science)
- Mike Wadness (Medford HS)
- Shane Wood (Irondale HS)
- Dan Karmgard (ND)
- Ken Cecire (ND)