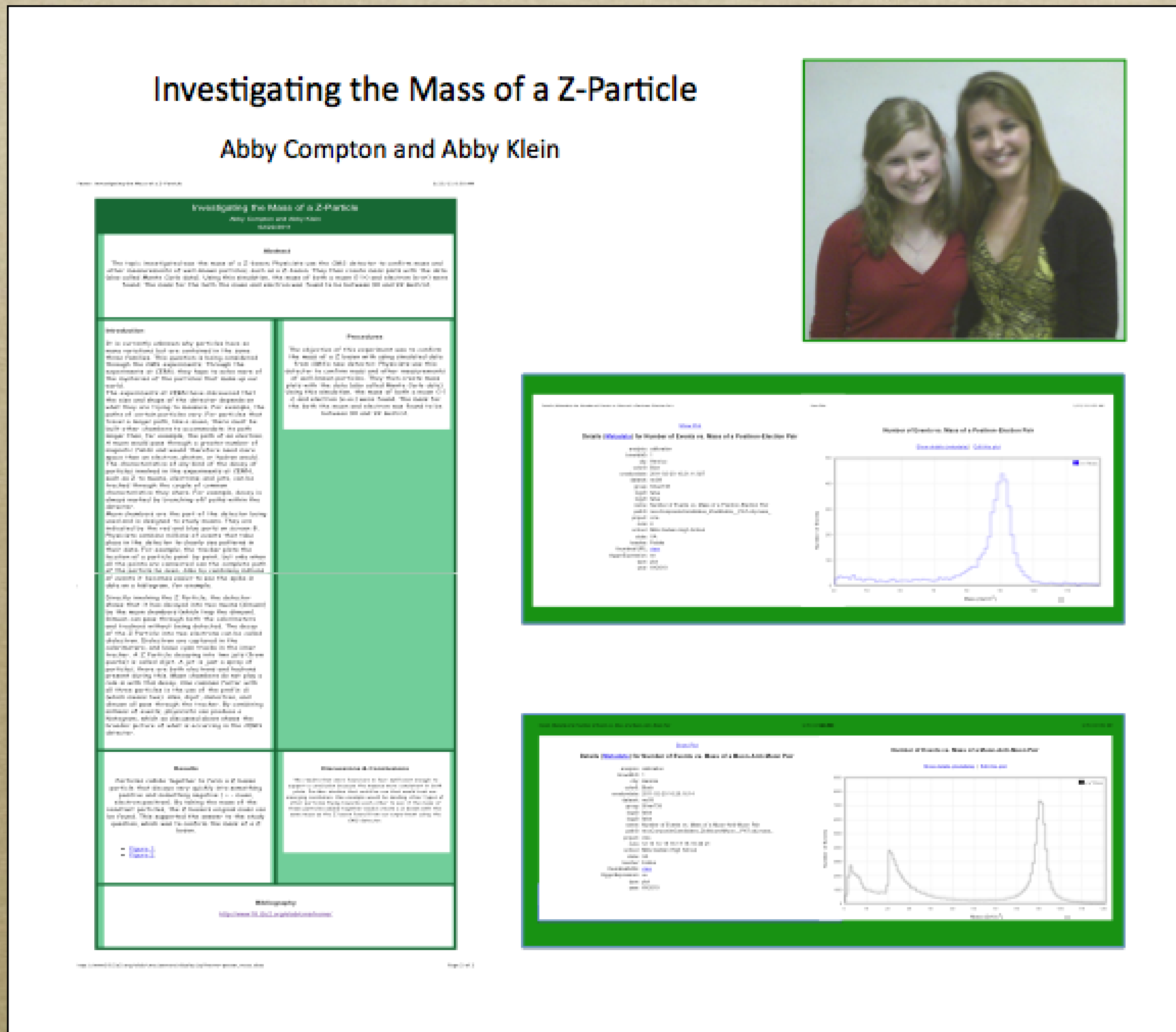
# CMS e-Lab Update

*Marge Bardeen & Tom McCauley*
*Fermilab*

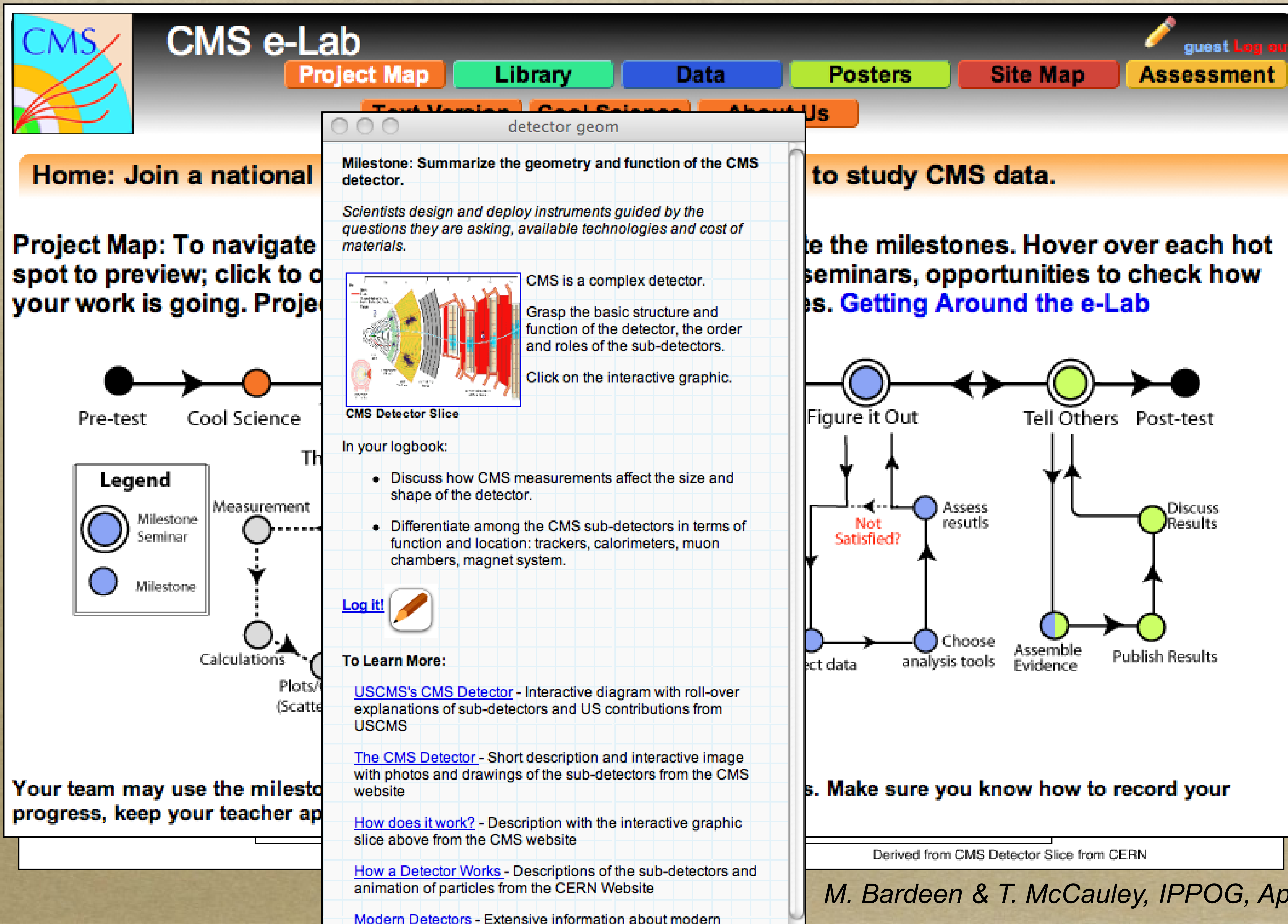
# What's Familiar: Videoconference
# What's Familiar: CMS Masterclass


*M. Bardeen & T. McCauley, IPPOG, April 2011*

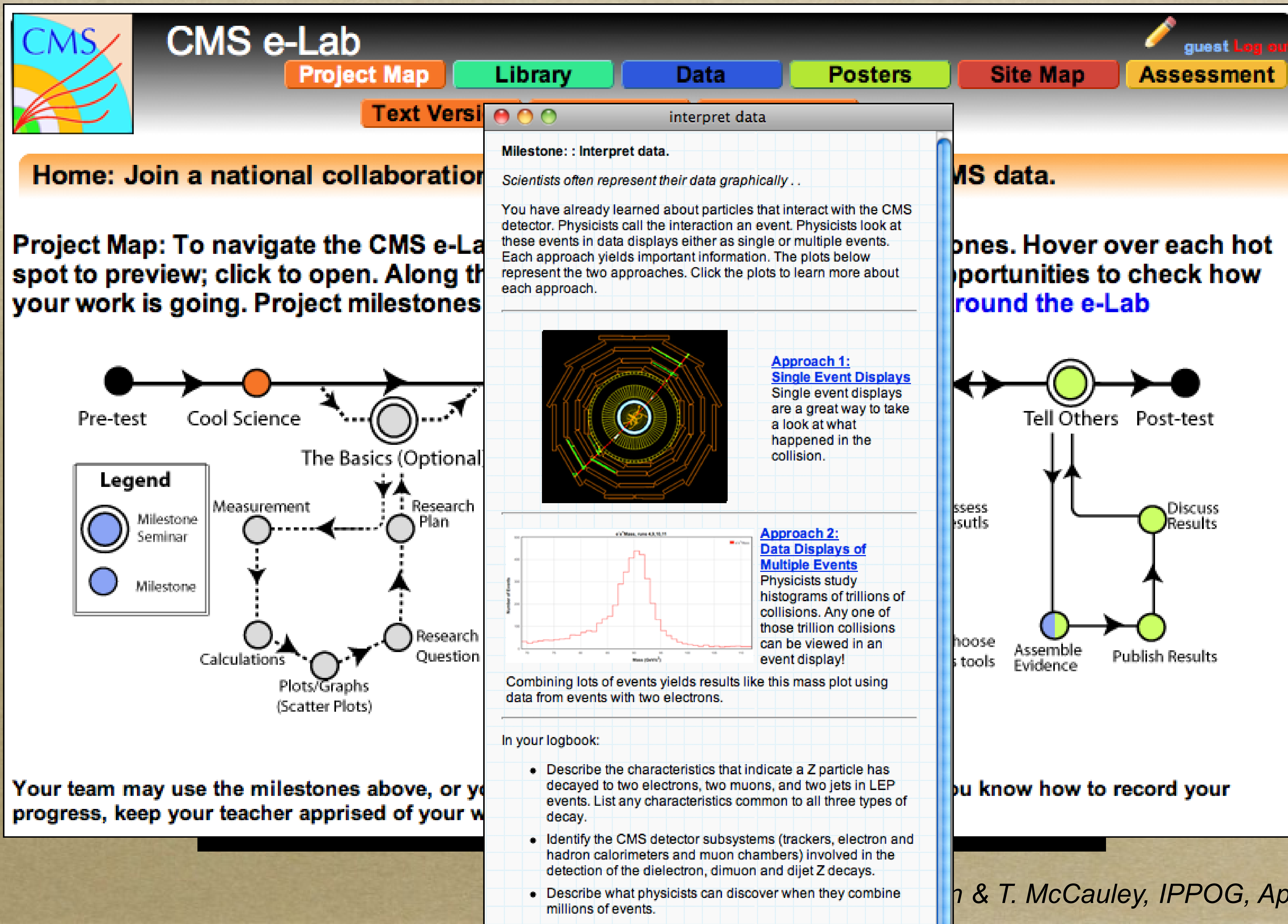
# What’s Different: e-Lab Poster Session



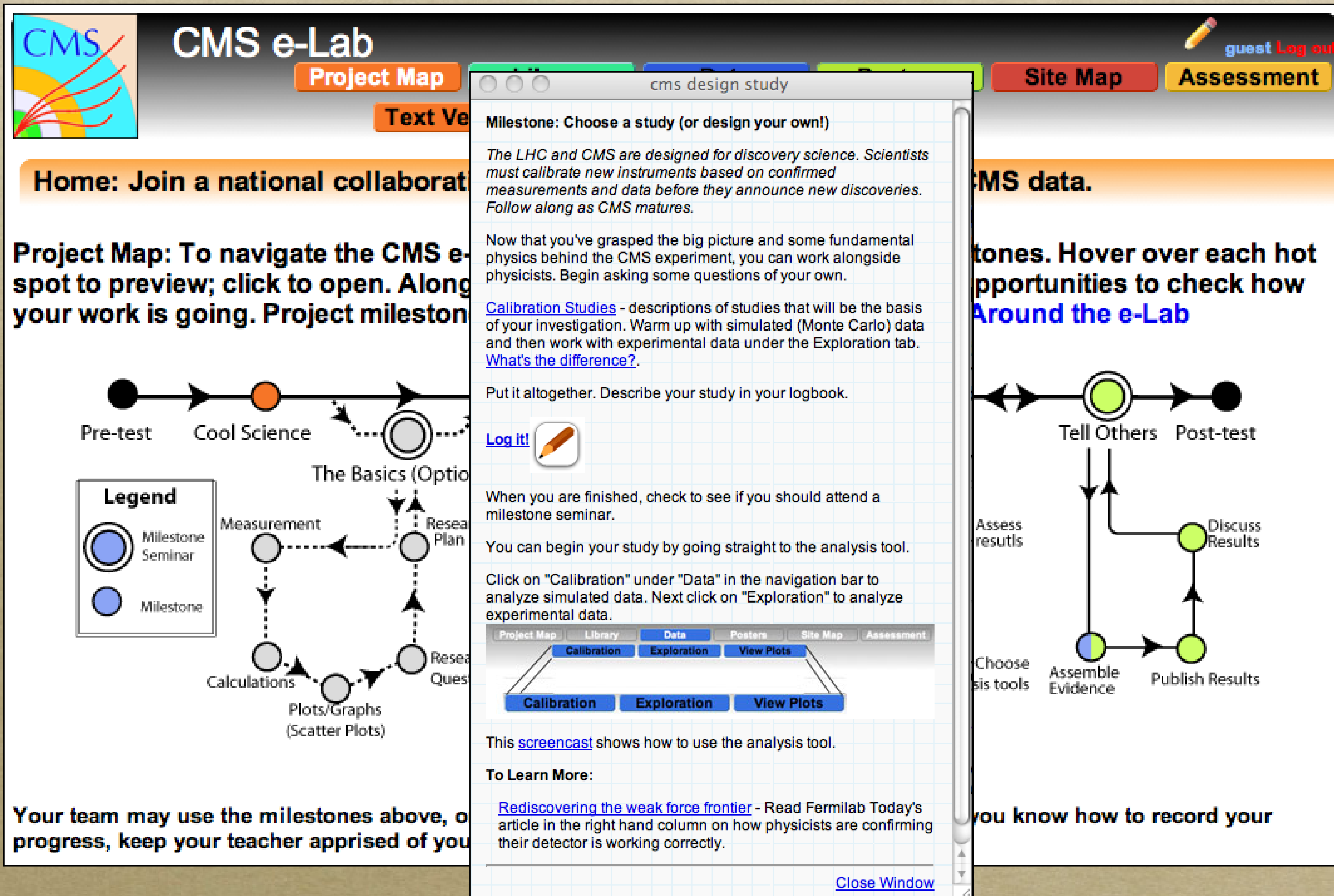
# Know Your Detector / Project Map



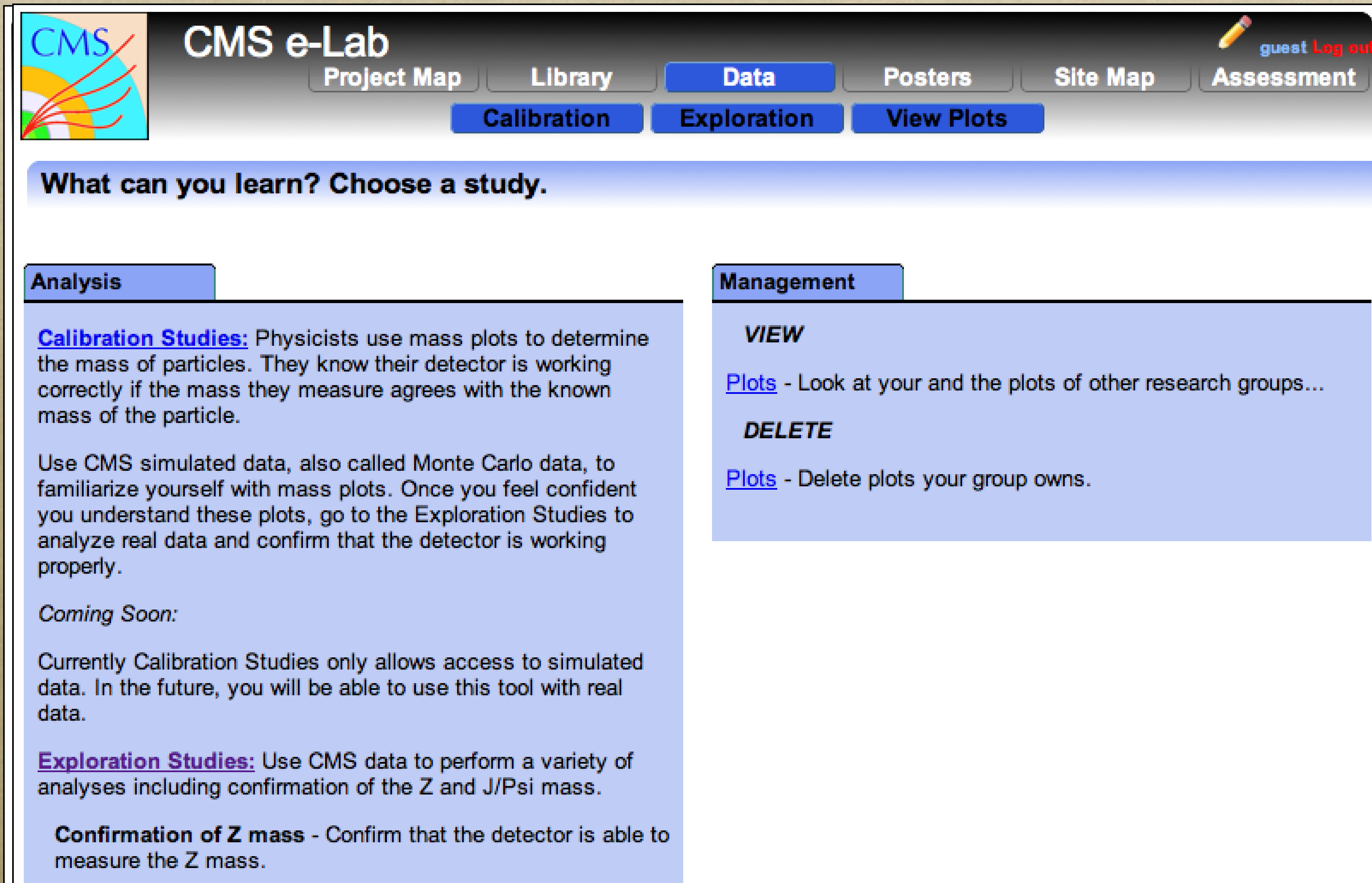
# Interpret Data



# Choose a Study



# Figure It Out




*M. Bardeen & T. McCauley, IPPOG, April 2011*

# CMS Data

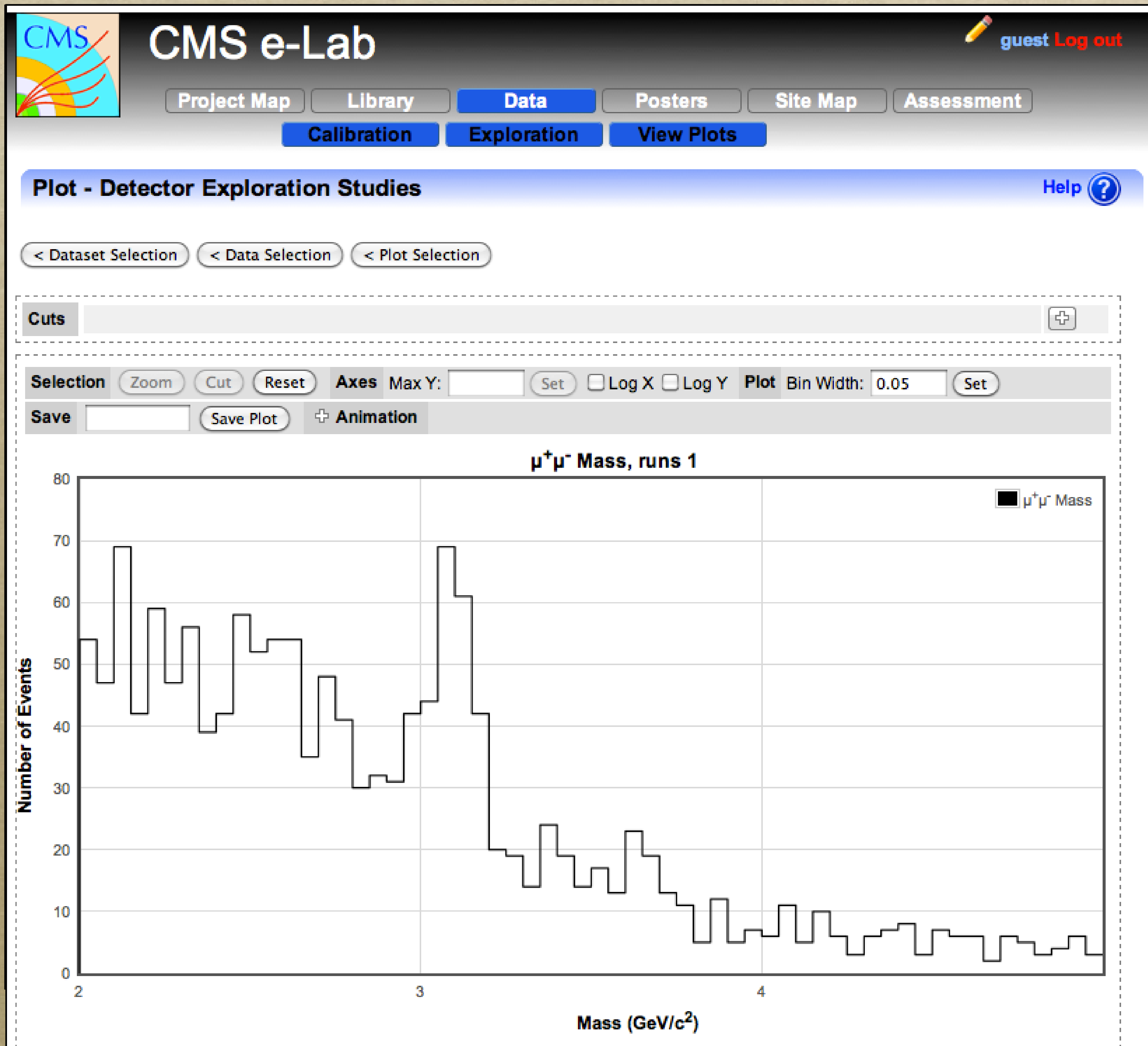
## *The CMS Collaboration has approved the following data to be made available for use in education and outreach:*

*(special thanks to D. Barney and R. Ruchti)*

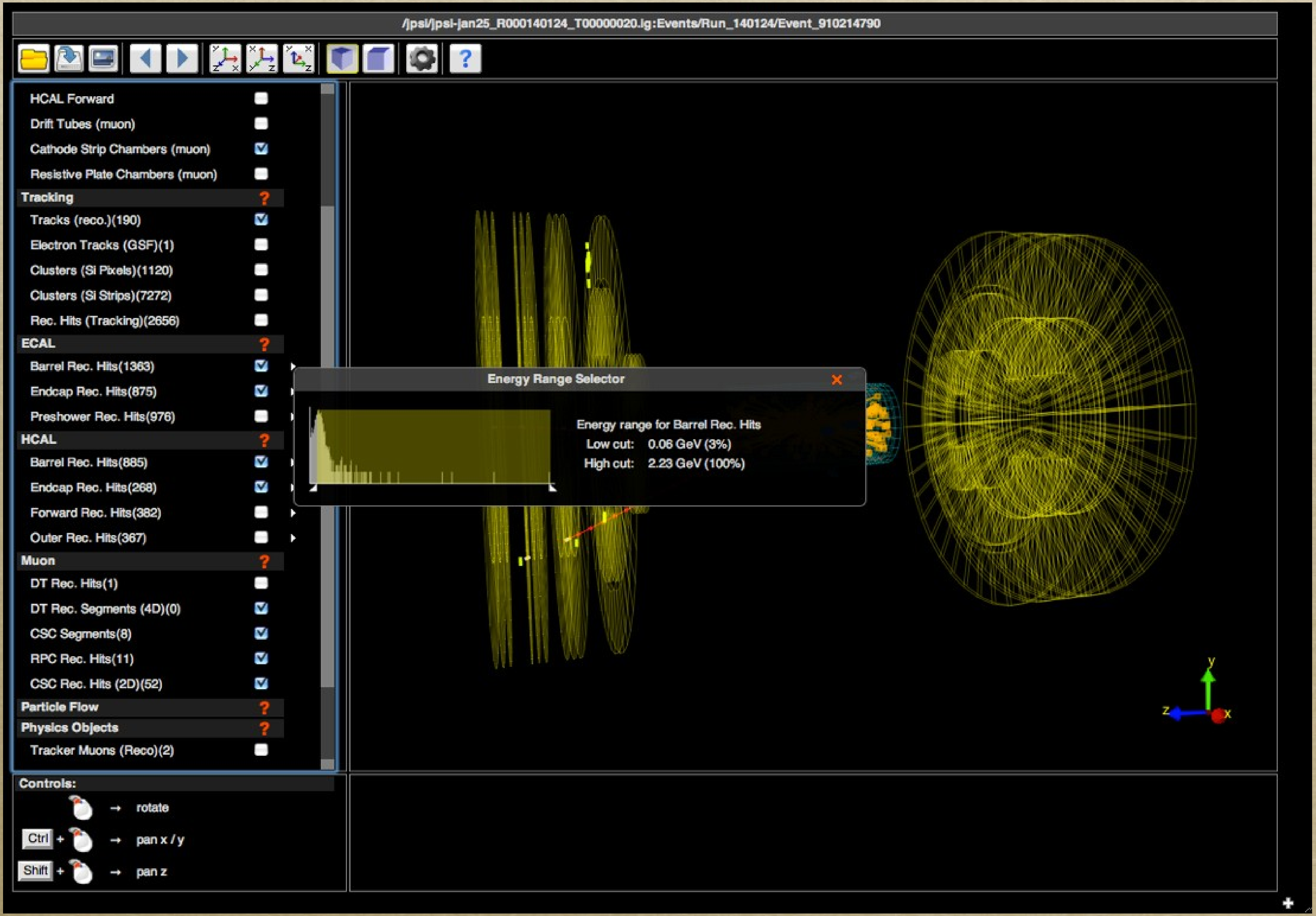
- *2000 events each of **J/ψ → μμ**, J/ψ → ee*
- *2000 events each of Υ → μμ, Υ → ee*
- *500 events each of **Z → μμ**, **Z → ee***
- *1000 events each of W → μν, W → eν*
- *100,000(!) events each of dimuon, dielectron, and dijet events in the energy range 2-100 GeV*

***Bold indicates sample already delivered and/or in use.***

# Explore the Data



# Explore an Event

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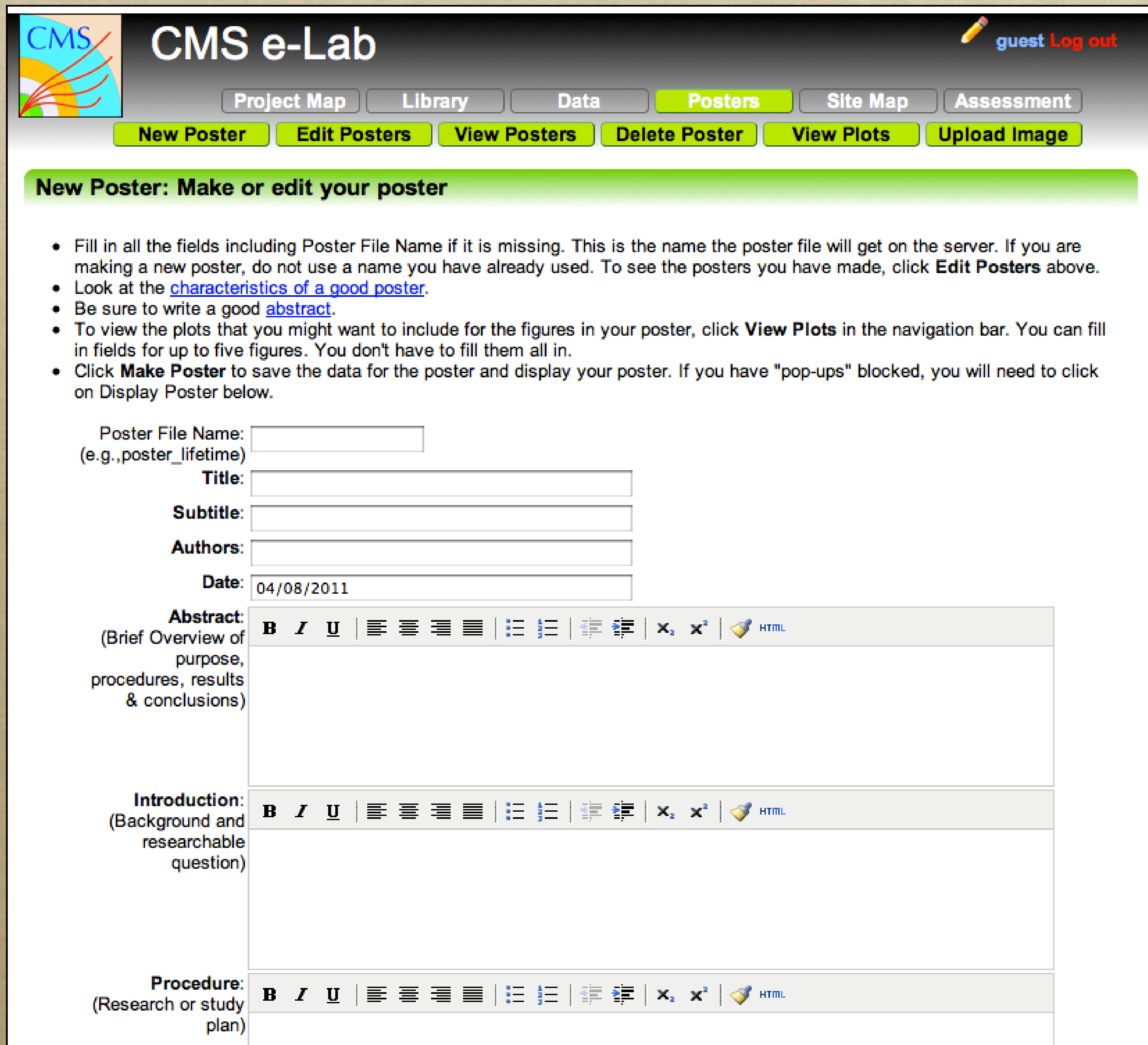
# Report Your Results



CMS e-Lab

guest Log out

Project Map | Library | Data | Posters | Site Map | Assessment

New Poster | Edit Posters | View Posters | Delete Poster | View Plots | Upload Image

**New Poster: Make or edit your poster**

- Fill in all the fields including Poster File Name if it is missing. This is the name the poster file will get on the server. If you are making a new poster, do not use a name you have already used. To see the posters you have made, click **Edit Posters** above.
- Look at the characteristics of a good poster.
- Be sure to write a good abstract.
- To view the plots that you might want to include for the figures in your poster, click **View Plots** in the navigation bar. You can fill in fields for up to five figures. You don't have to fill them all in.
- Click **Make Poster** to save the data for the poster and display your poster. If you have "pop-ups" blocked, you will need to click on Display Poster below.

Poster File Name: (e.g.,poster_lifetime)

**Title**:

**Subtitle**:

**Authors**:

**Date**: 04/08/2011

**Abstract**: (Brief Overview of purpose, procedures, results & conclusions)

**Introduction**: (Background and researchable question)

**Procedure**: (Research or study plan)

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# Assess Your Work

CMS e-Lab

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## Objectives: Assessing Your Work (CMS e-Lab)

The following objectives outline what you will learn and be able to do during this study of CMS data. For assessment follow the guidance your teacher gave you at the beginning of the project.

- Content and Investigation Objectives:
  - Describe particles colliding in and emerging from collisions detected by CMS as predicted by the Standard Model.
  - List in order and describe the CMS subdetectors in terms of the properties of the particles they detect.
  - Explain the role that conservation of mass/energy, momentum, and charge play in analyzing events detected at CMS.
  - Design, conduct and report on an investigation of a testable hypothesis for which evidence can be provided using CMS data.
- Process:
  - Explain the data collection process including what corrections need to be made in order to obtain reliable data.
  - Evaluate the data to decide which are reliable/usable and which are not and explain how they arrived at the decision to include some data and exclude others.
  - Collect, organize and analyze data to obtain meaningful findings.
  - Use the data to provide evidence to support their claims.
- Computing:
  - Explain why they used specific computing resources in their analysis.
- Literacy:
  - Demonstrate an ability to express meaning in writing (such as in science notebooks, reports) and come to agreement about meaning with others (such as peer review, discussion).

# Next Steps

Produce data

Improve tools

Develop background for new studies

# Kudos and Credits


"Over the course of the program, I, along with the others in my class, had a chance to experiment with simulated data and develop skill sets in particle physics, as well as form an understanding of the CMS experiment at CERN. Though I doubted the ability of an online course to convey the details and intricacies of such a theoretical branch of physics, I was pleasantly surprised to discover that, through your course, I could fully learn and understand the "big questions" CERN physicists and experimenters hope to uncover; my lab partner and I found ourselves slowly being enchanted by the world of high energy physics that was then so new to us. Because the program you've established is such a brilliant way of teaching students who are interested in the questions and theories of particle physics, I thought I might pass along my feedback . . . "

*Honors Physics Student, Mills Godwin High School*

Major Contributors: M. Bardeen – D. Barney - K. Cecire - M. Hategan - T. Jordan
D. Karmgard - T. Loughran - L.Taylor - T. McCauley - P. Nguyen - L. Quigg - R. Ruchti - M. Wilde