

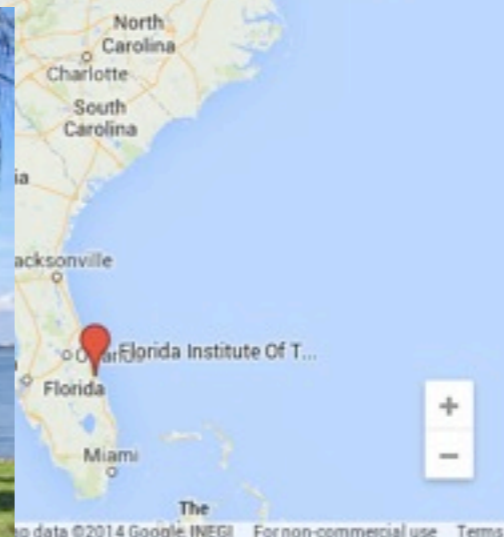
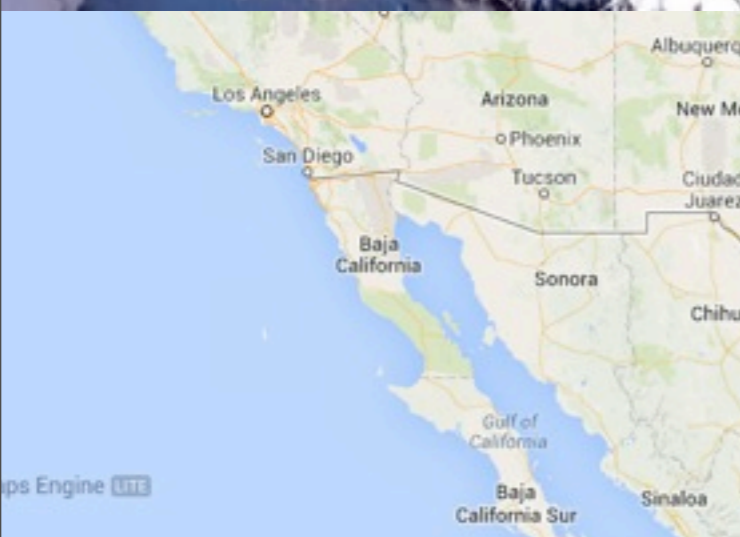
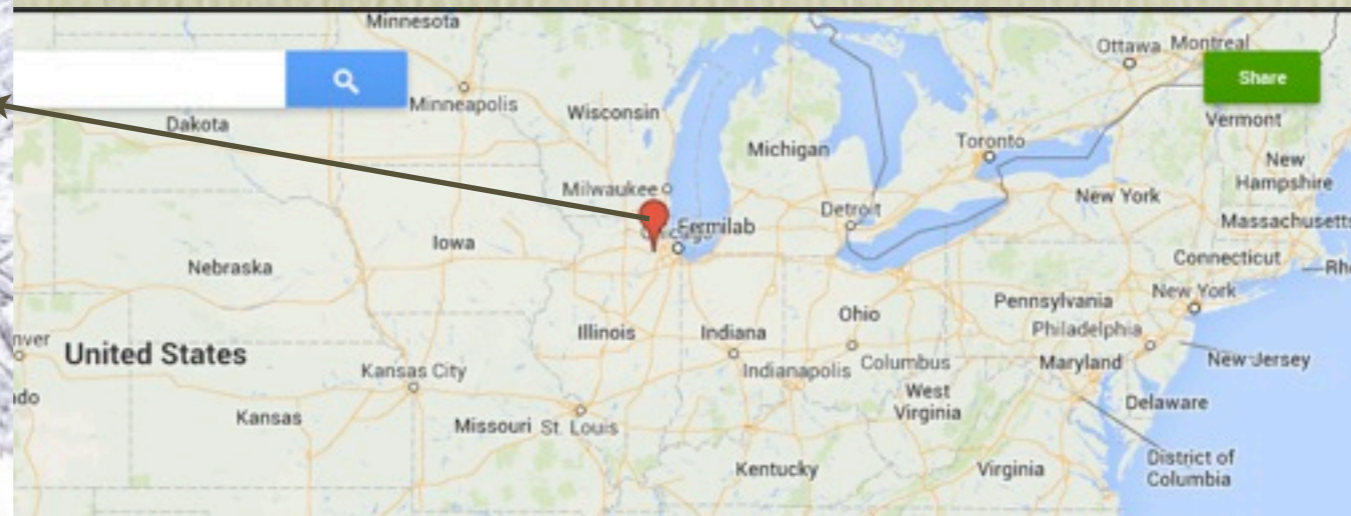
Titas Roy



Florida Institute of Technology
LPC 10 Symposium
07.17.2014

about me ...

I am a second year graduate student,
and have been stationed at the LPC since September, 2013.



My work at LPC : QIE10 (HF upgrade FEE)



Our lab on the 14th floor

Charge Integrator and Encoder (QIE)

ASIC chip : which is an integral part of the **HCAL Front-end Electronics**. The current QIE8s in CMS is going to be replaced with the QIE10s.

The QIE10 converts the **analog** signal coming from the **PMTs** into **digital** and provides **timing information** regarding the arrival of the pulse which was previously missing in the QIE8s.



QIE10 soldered on a daughter board



The QIE test stand

The QIEI0(HCAL) Group

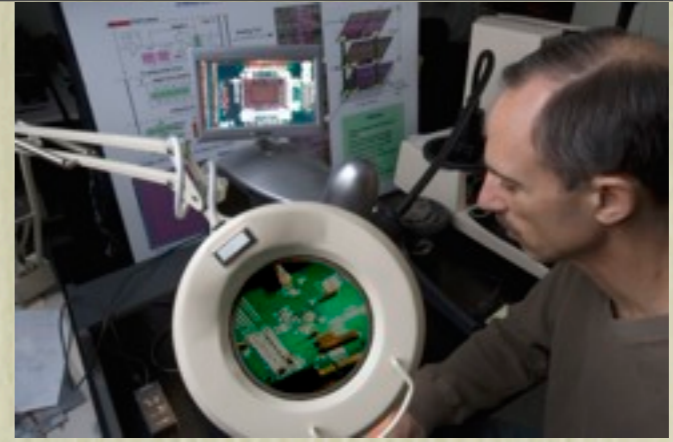
Graduate Students: **Elliot Hughes** & **Titas Roy**



Elliot
Hughes(Rutgers)



Titas
Roy(FIT)



Tom Zimmerman (FNAL Engineer)



Louis Dal
Monte(FNAL
Engineer)

Daryl Hare(FNAL
Postdoc)



Jim Hirschauer (FNAL
Wilson Fellow)



Merle
Watson(FNAL
Engineer)

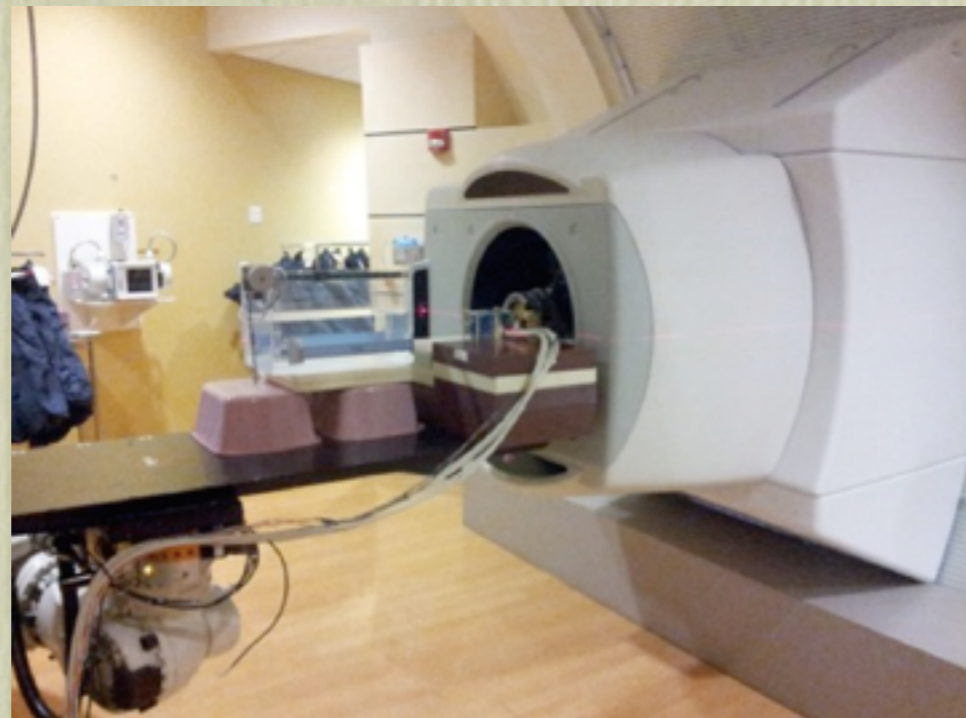


Jim Freeman(FNAL
Scientist)

Summary of the last year and the current status of the QIE10

I got the opportunity to learn about HCAL, Radiation testing and had hands-on experience in electronics & hardware

- Tested around **320 QIE10 (prototype 5)** chips and they are **functioning as expected**.
- Developed **procedures and tools** to carry out the testing of the chips effectively.
- **Radiation testing** of the chip at Central DuPage Hospital.

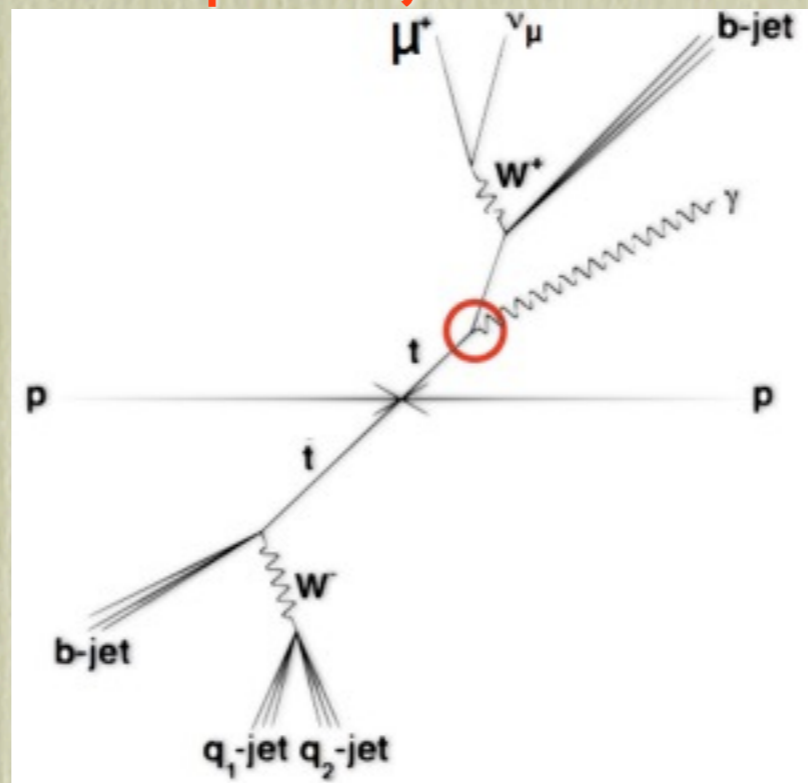


at Central
DuPage Hospital

- A large number of chips are under production and **Robot testing** is being developed to be able to test them efficiently.
- I am currently writing a **Detector Note (CMS-DN-14-010)** summarizing the QIE10 .

Physics Analysis at LPC

- Measuring the **cross section of top quark pair in association with a photon** @8TeV (2012 data), in the **lepton+jets** channel .



- The motivation : The direct measurement gives us more knowledge about the **electromagnetic coupling** of the top quark and it's correlation with the **top quark charge** which in turn helps in more studies and searches for BSM
- This signal is also background for other analyses like Higgs searches and SUSY searches
- The expected NLO cross section @8TeV \sim **2.5 pb**

The *ttgamma* CMS Group

Heiner Tohlen (Hamburg, Germany)

Nik Berry (Brunel University, UK)

Till Michael Arndt (RWTH Aachen, Germany)

Mikhail Makouski (Kansas State University, US)

Andrew Ivanov (Kansas State University, US)

Yuri Maravin (Kansas State University, US)

Francisco Yumiceva (Florida Institute of Technology, US)

Héctor Hernández (Florida Institute of Technology, US)

Titas Roy (Florida Institute of Technology, US)

Current Status

Muon +jets channel is approved. Cross Section as measured by CMS in this channel @8TeV : $2.4 \pm 0.2(\text{stat}) \pm 0.6(\text{sys})$ pb.

(PAS-TOP-13-011)

Lepton+jets & Dilepton combination is planned for Fall, 2014 and a publication by the end of this year.

A little about the Florida Institute of Technology Group...

Dr. Francisco Yumiceva (LPC Distinguished Researcher):

HCAL Phase I (FEE) upgrade, Top Physics, Phase 2 upgrade -HGICAL Simulations.

Graduate Students-

Titas Roy, Héctor Hernández, Shiyuan Xu

Undergraduate Student- *Robert Schmezle*

Other Members:

Dr. Marc Barmaand (HCAL and Top Physics)

Dr. Marcus Hohlmann (GEM Detectors and Physics Analysis)

Graduate Students:

Vallary Bhopatkar Sali,

Ankit Mahapatro

Elizabeth Sterling

Himali Kalakhety

Post Doc: Aiwu Zhang



HF tester card

Other activities at LPC I have participated in :

- CMS Data Analysis School
- HATs Tutorials:
 - Statistic Tools
 - Calorimeter upgrade technologies/simulations
 - Photons
- LPC Topic of the week
- Physics Forum



CMSDAS Jan 2014, LPC

I plan to continue working in these topics and
return to the LPC next summer

Thank you to LPC ! :)