

# RPC Ibero and Mexican contribution to CMS

Salvador Carrillo

Institution CMS Team Leader  
(CMS RPC Resource Manager)

(CMS GIF++ Longevity and Test Beam  
Responsible)



# Mexican involvement in CMS

- 4 people ( 2 Professors & 2 PhDs) from 3 Mexican institutions join CMS around 2006.
  - Heriberto Castilla CINVESTAV
  - Antonio Morelos UASLP
  - Alberto Sánchez CINVESTAV
  - Salvador Carrillo IBERO

We contributed to the Tracker, with very few integration and responsibilities and we did struggle every year to complete EPRs.

By 2014 Mexican contribution was 1% of CMS and we have since then been from 11 to 16 Authors

(Second Largest CMS contribution in Latin America)

Now Four Institutions:

CINVESTAV, IBERO, BUAP & UASLP.

# CMS RPC Subsystem

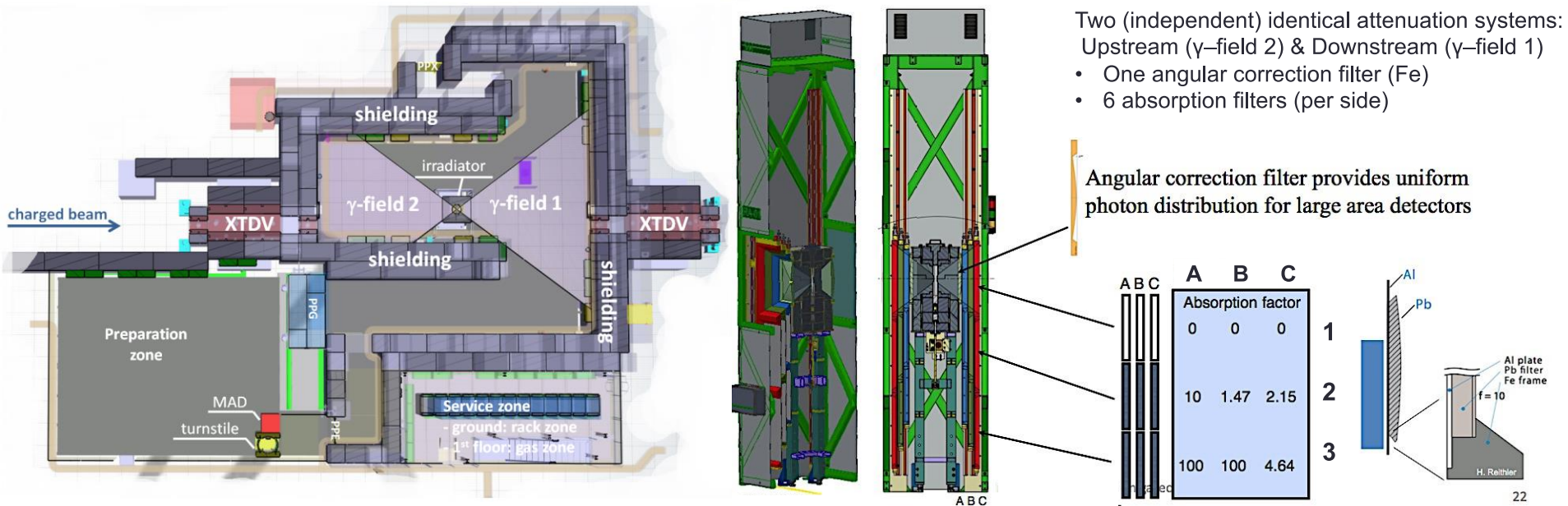
## Mexican contribution

Recently (2015) we join CMS RPC Subsystem, and since then we have mainly contribute to Test Beam Longevity, R&D for Phase-II and some undergraduate student participation in Detector Performance (CMS DGP)

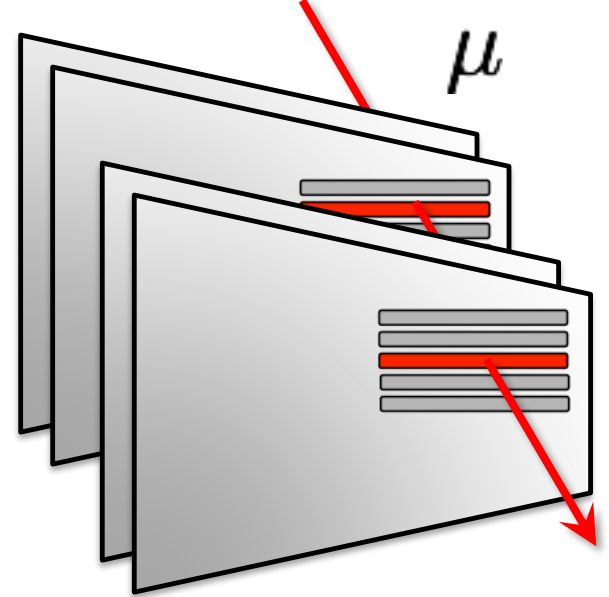
- Salvador Carrillo Moreno (2006) CMS Institution Team Leader
  - CMS RPC Resource Manager 2018-2019
  - CMS RPC GIF++ Longevity and Test Beam LV3 Coord. (2016-2017)
  - CMS RPC Chamber Production LV3 Responsible for Phase-II (2018-2020)
    - All mexican institutions will participate in the Assembly of CMS RPC for Phase II
- Elsa Fabiola Vázquez Valencia (2010) CMS Intitution Deputy
  - CMS Muon Editorial Board (Since 2016)
- Cristina Oropeza Barrera (2014)

# GIF++ technical description

Gamma Irradiation Facility. It is specifically suited to test large area muon detectors in radiation conditions similar to those at the experiment CMS. . It has a Cs<sup>137</sup> gamma source of 13.9 TBq and a beamline (H4).

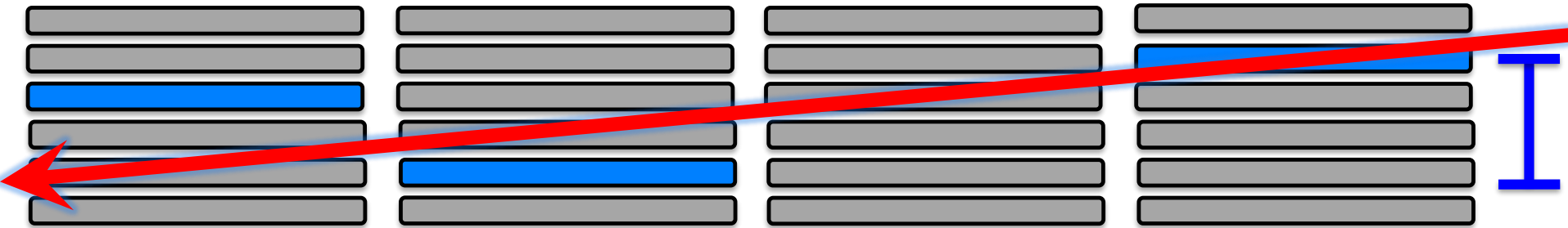


# Variable Definition:



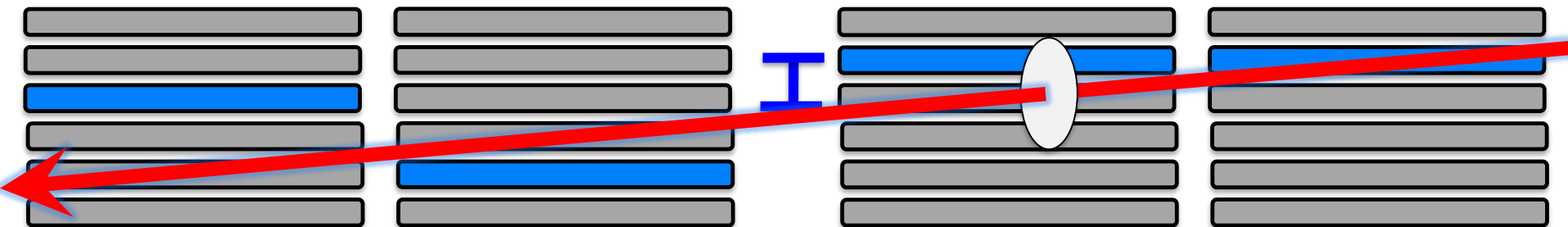
Maximum strip difference between chambers

**GIFStripDiffCut**

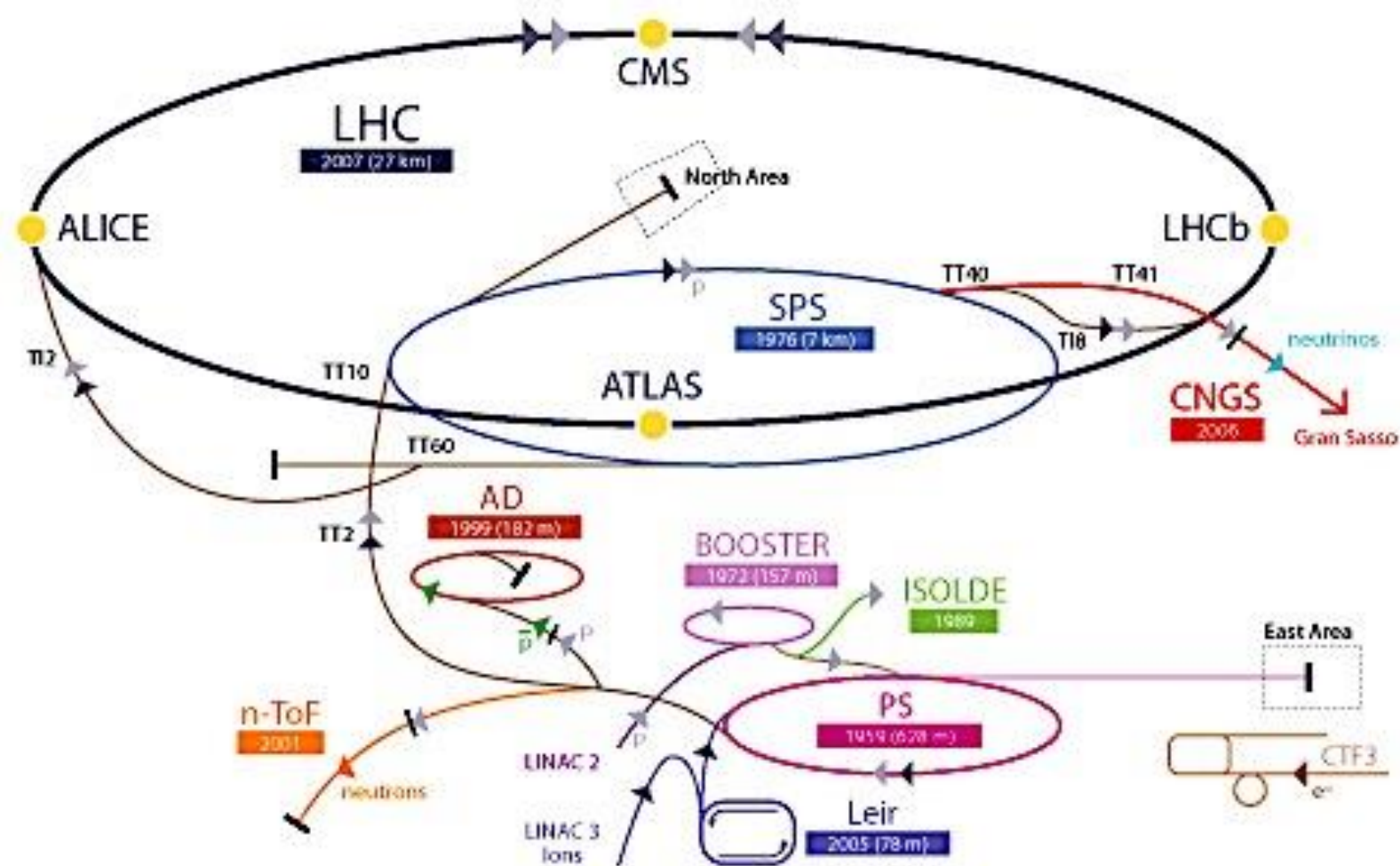


Difference between Projected Strip Value vs Test Chamber

**GIFStubDiffCut**



# CERN Accelerator Complex



▶ p (proton)   ▶ ion   ▶ neutrons   ▶  $\bar{p}$  (antiproton)   ▶ neutrinos   ▶ electron  
 ↔↔↔ proton/antiproton conversion

LHC Large Hadron Collider   SPS Super Proton Synchrotron   PS Proton Synchrotron  
 AD Antiproton Decelerator   CTF3 Clic Test Facility  
 CNGS Cern Neutrinos to Gran Sasso   ISOLDE Isotope Separator OnLine DEvice  
 LEIR Low Energy Ion Ring   LINAC LINEar ACcelerator   n-ToF Neutrons Time Of Flight



# GIF++ Facility @CERN

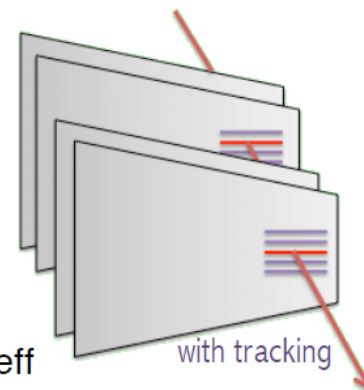
GIF Bunker Overview

2018-01-12 CER 01:00:03

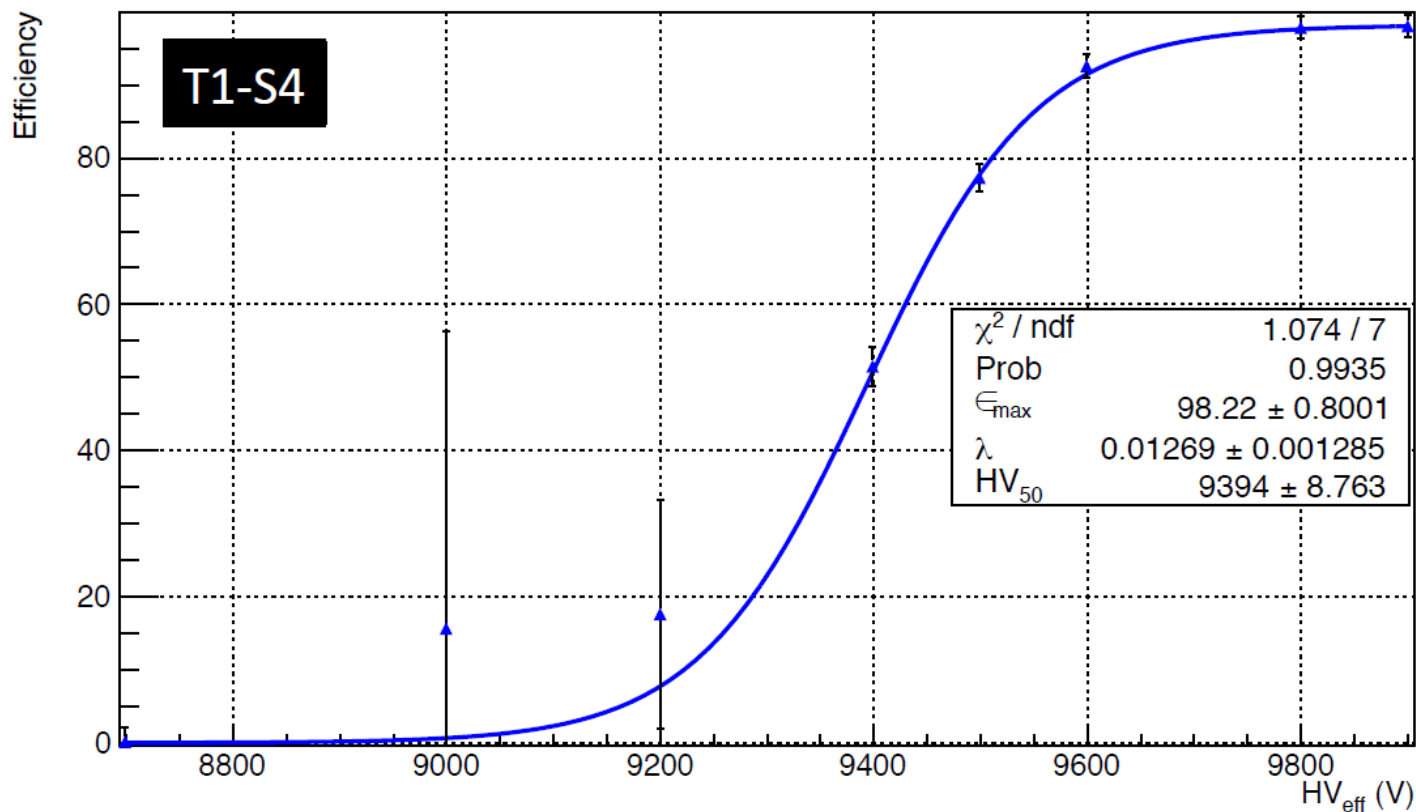


# Some preliminary results

Source OFF

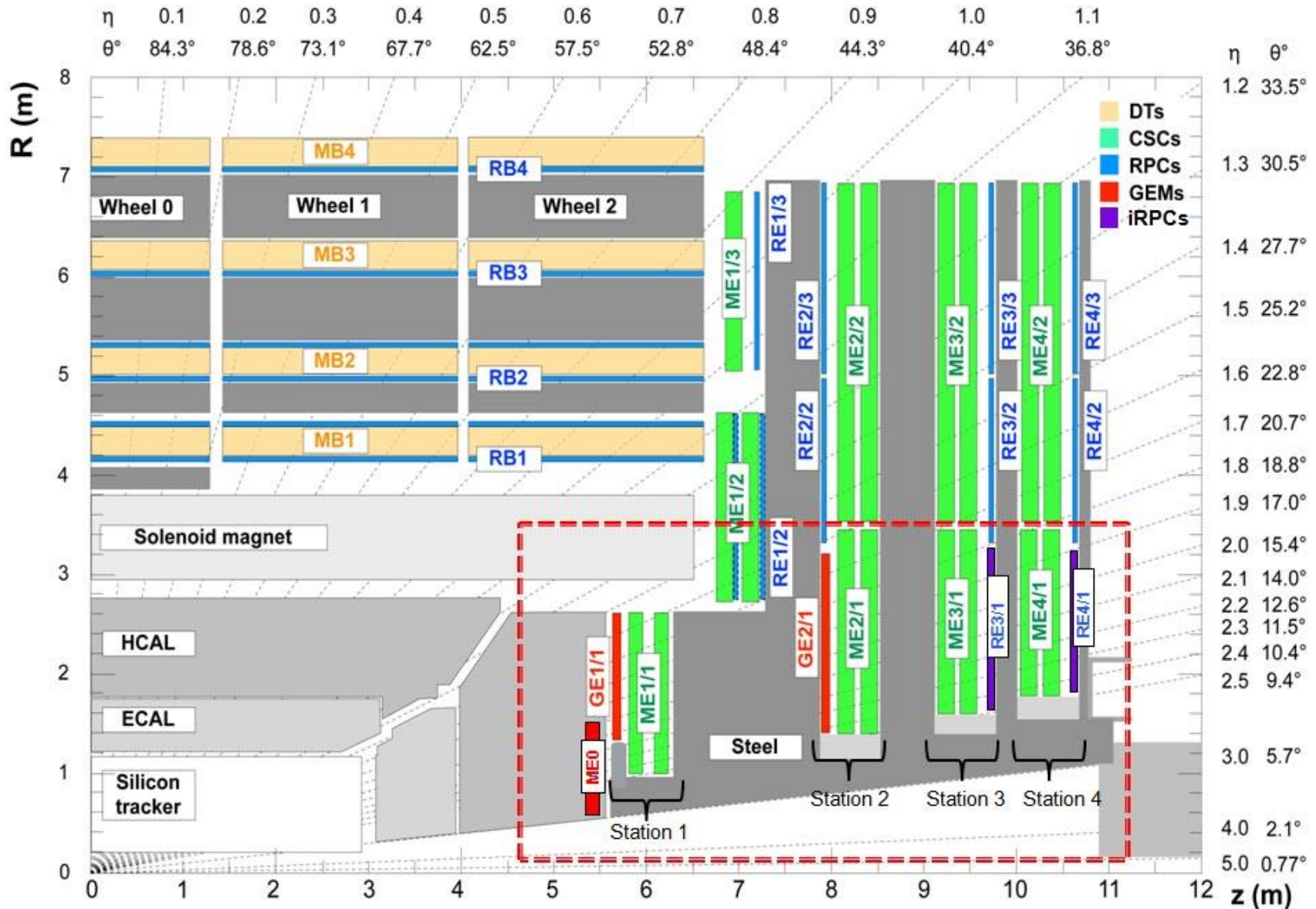


eff/HV-Scan\_BeamON\_SourceOFF\_001.0\_20151031011032.eff





# CMS (P5) Muon upgrade



# This year CMS participation:

- GIF++ & Test Beam challenges:
  - Since Long Shutdown we need to validate/certificate our efficiency measurements for CMS RPC Longevity program
    - Currently using muons from SPS Nort Area Test Beam and we need to continue for one more year wich means that we need to use cosmic muons to continue our efficiency measurements.
- CMR RPC Construction and Assembly
  - Mexico will 100% Participte on Phase II with a total mexican contribution of 1 Million CH

# This year CMS participation:

## CONTINUE

- Biannual RPC International Congress:
  - XIV Workshop on Resistive Plate Chambers and related detectors (Feb 19th-24th) Puerto Vallarta
  - ✓ We are the Institution Responsible for this
- Before the Workshop we will have a Detector RPC School (“hands on”) Feb 14th-16th
  - Strong participation from RPC Experts: ATLAS, CMS, ALICE, etc. Mainly for Mexican and other international students.
  - IBERO, BUAP, CINVESTAV & UNAM.

# This year CMS participation: Finally

- Internally at IBERO we won an infrastructure grant to build a RPC Detector Lab for R&D and to participate with the Assembly and test of CMS Phase II
- We have strong participation of mainly from undergraduate students

## Physics engineering

- Jorge Morales, Genoveva González, Diego Berdeja, Cleomenes Stamatiades, Osvaldo Miguel

## Engineering

- Miguel Calderón, Jorge Ciprian , Dante

This year 3 of us will be from one month to 3 months at CERN with 3 undergraduate students

- CMS GIF++ Test Beam, CMS DPG, New detector assembly performance measurements.

# Our future contribution

- Analysis:
  - One student (undergraduate) Ricardo Zamora working with CINVESTAV on B Physics analysis
- RPC Test Beam and Longevity program (two more years) 2018 & 2019
- RPC Detector Performance (P5)
  - All charge, current, etc. has been extracted since CMS started and converted to a simpler database format, we will continue with this institutional responsibility and we will prepare a RPC official web page for people to extract information for DPG analysis. (we will start this task responsibility summer this year).



# Our best interest

We are looking forward to increase our CMS participation with Notre Dame, but also increase our inter-institutional collaboration among us to further consolidate current outreach work and wider our relation with you to from our Group, Department and Institution.

We are very please and honor to host our first meeting and we are looking forward for a wider and strong collaboration for the best of our future.

# Final words

- We are very please and honor to have you here with us to work on outreach and research

Bienvenidos a México

Gracias por la confianza en nosotros