



# **Performance of GEM (Gas Electron Multipliers) detectors**

Mentee: Nia Curry (Spelman College)  
Mentor: Pieter Everaerts (CERN)

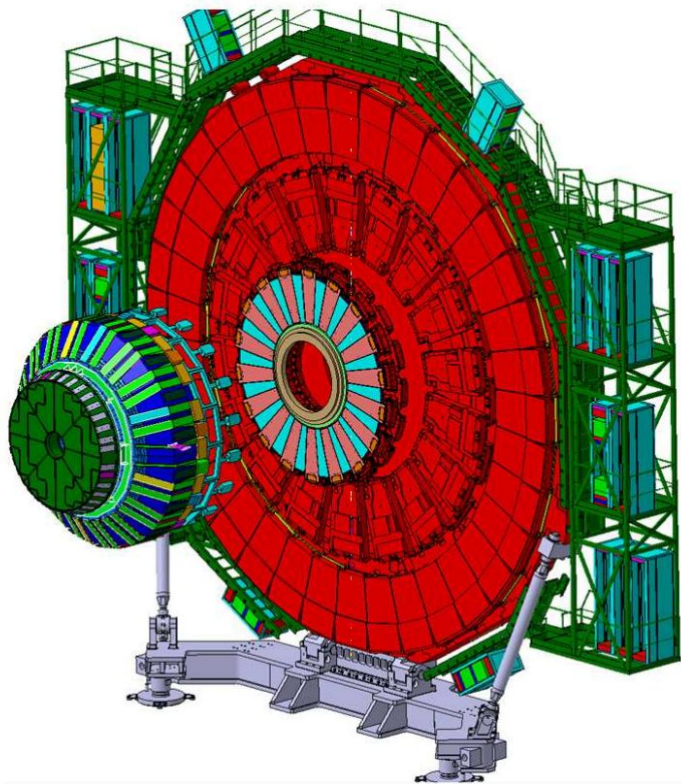


# Abstract

Gas Electron Multipliers (GEM) detectors will help enhance the performance of the CMS experiment. To ensure that the data stays in the storage system and expands coverage in the muon system, Triple-GEM chambers will be placed in three stations of the CMS end caps.

The first GEM station was installed between July 2019 - September 2020 to improve the muon track reconstruction and reduce the trigger rate.

GE1/1 is a pilot project and will help give an understanding on what should be done for a full integration of the GEM subsystem within CMS.





# Introduction

- The CERN LHC is being upgraded in order to implement proton-proton collisions at a center-of-mass energy of 14 TeV and an instantaneous luminosity exceeding 7.5 times the original design value.
- Novel gas detectors are being installed in the first and second disks and employed in the ME0 station to extend the systems coverage.
- CMS GEM detector is composed of a drift board, a readout PCB, and triple-GEM (a stack of 3 GEM foils)



## Work to do / Method

- Look at data and get proper mathematical model for it.
  - Crosscheck measurements and make sure they are accurate.
- 
1. Put a fixed threshold (as low as possible)
  2. Inject more and more charge
  3. Check when we start seeing hits



# References

<https://cdsweb.cern.ch/record/2809098/files/CERN-THESIS-2021-327.pdf> (Thesis)

[https://docs.google.com/presentation/d/1CVp8Pzo-PMt8Wm3g6xQ9rsqPitRttifpzWjJxzXKewQ/edit#slide=id.g106465b4f51\\_0\\_0](https://docs.google.com/presentation/d/1CVp8Pzo-PMt8Wm3g6xQ9rsqPitRttifpzWjJxzXKewQ/edit#slide=id.g106465b4f51_0_0) (powerpoint presentation)