RPC Detector Readiness Study for Heavy Ion collisions

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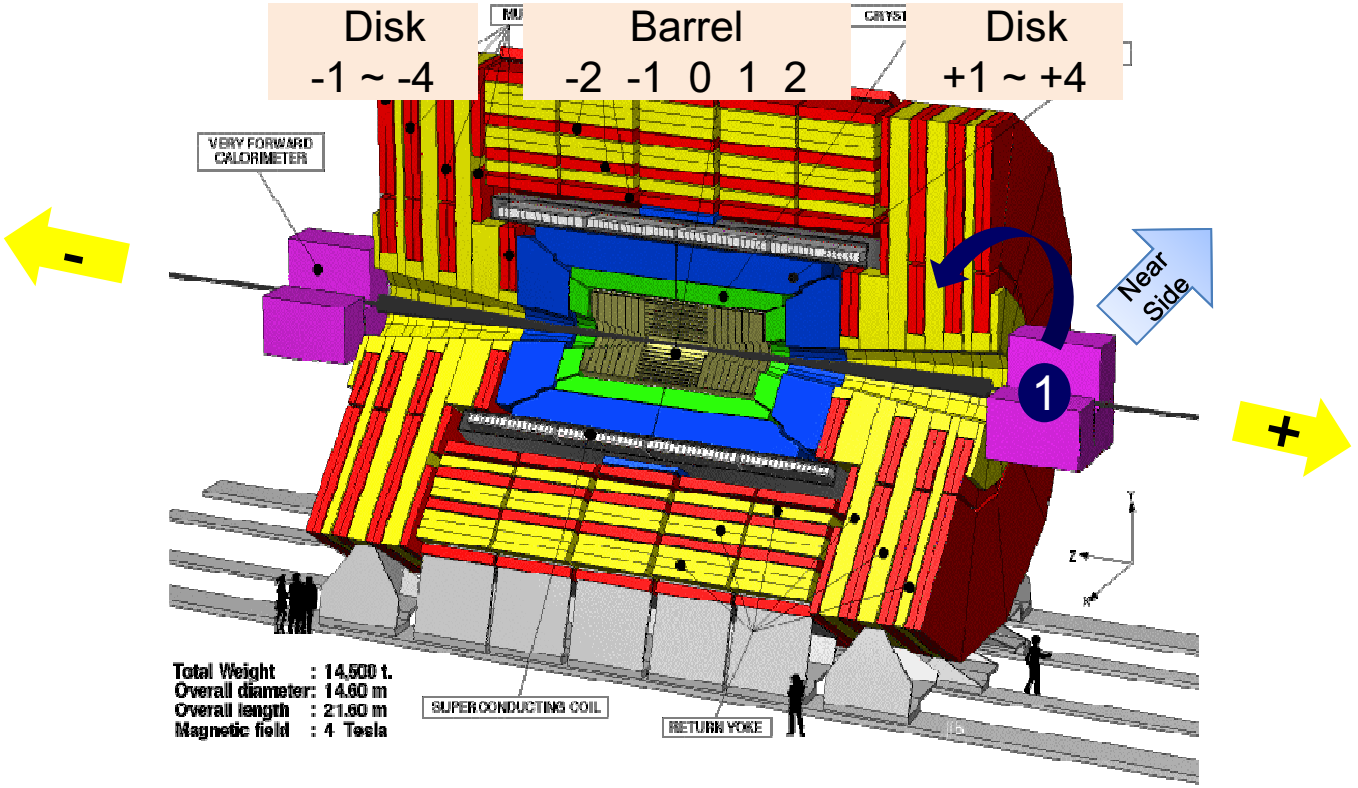
CMS RPC specifications

- Trigger detector for muon system
  - Efficiency : > 95%
  - Time resolution : ≤ 3 ns (98% within 20 ns)
  - Average cluster size : ≤ 2 strips
  - Rate capability : ≥ 1 kHz/cm^2

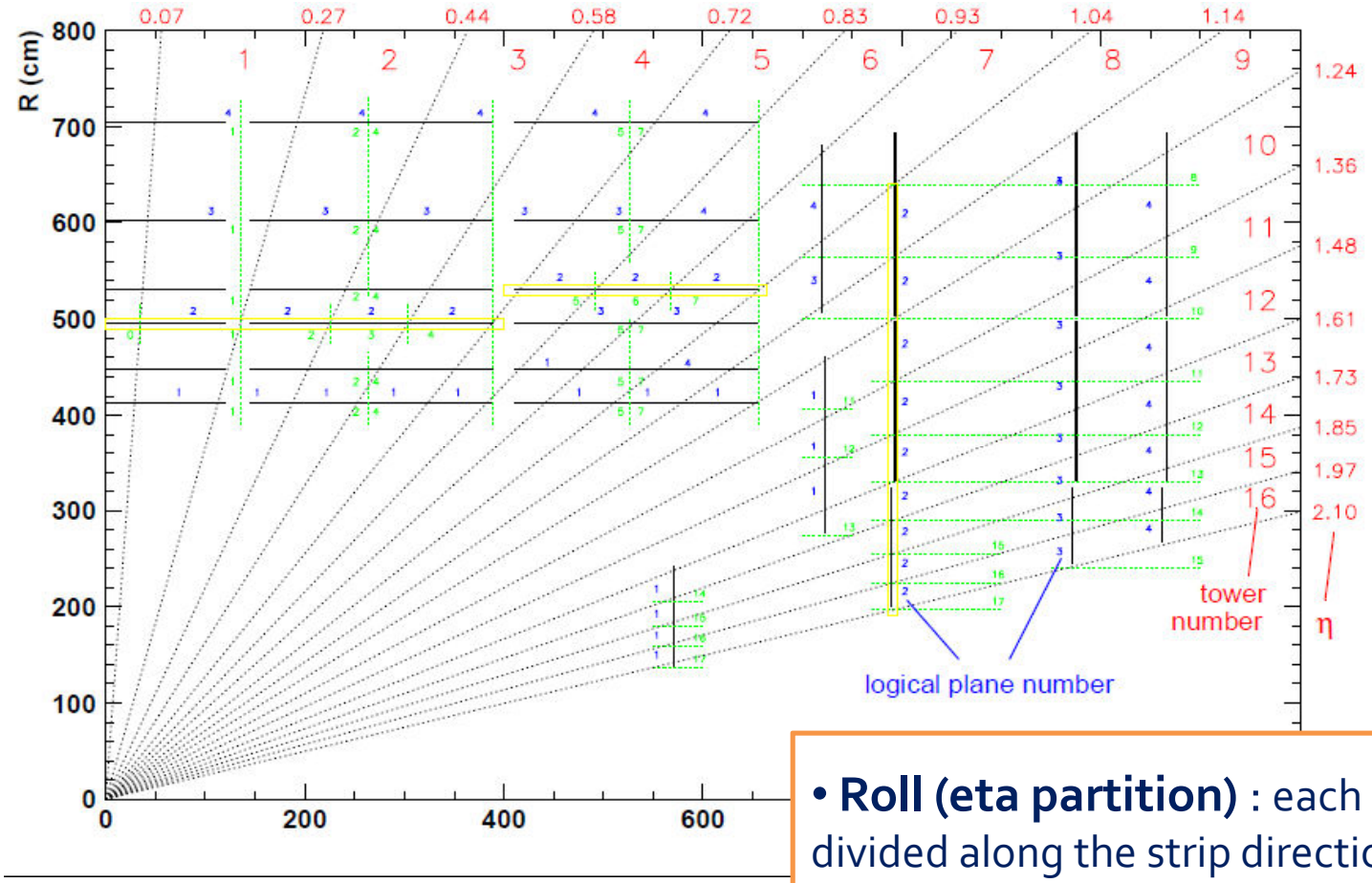
    : according to aging test, in ≤ a few kHz/cm^2 efficient

Structure of RPC system



- Sector : the group of chambers at same phi (and increasing r)
- Barrel : 12 sectors
- Endcap : 6 sectors

Structure of RPC system



- **Roll (eta partition)** : each chamber is divided along the strip direction in two or three parts (rolls) for Barrel and two, three or four parts for endcap

Environmental Setup

- Hydjet sample
  - Central b=0 (2000 events)

dcap:///pnfs/cmsaf.mit.edu/t2bat/store/mc/Summer09/Hydjet_B0_4TeV/Gen-SIM-RAW/MC_31X_V2-GaussianVtx_311_ver1

  - Minbias (2000 events)

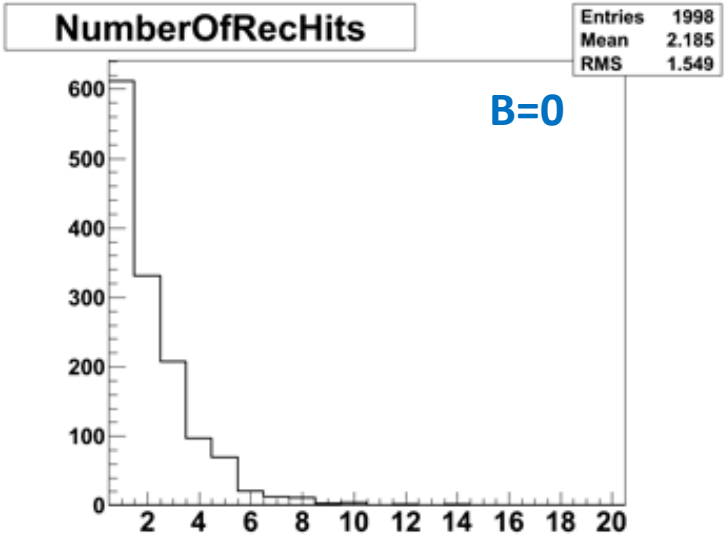
dcap:///pnfs/cmsaf.mit.edu/t2bat/cms/store/mc/Summer09/Hydjet_MinBias_4TeV/GEN-SIM-RAW/MC_31X_V2-GaussianVtx_311_ver1

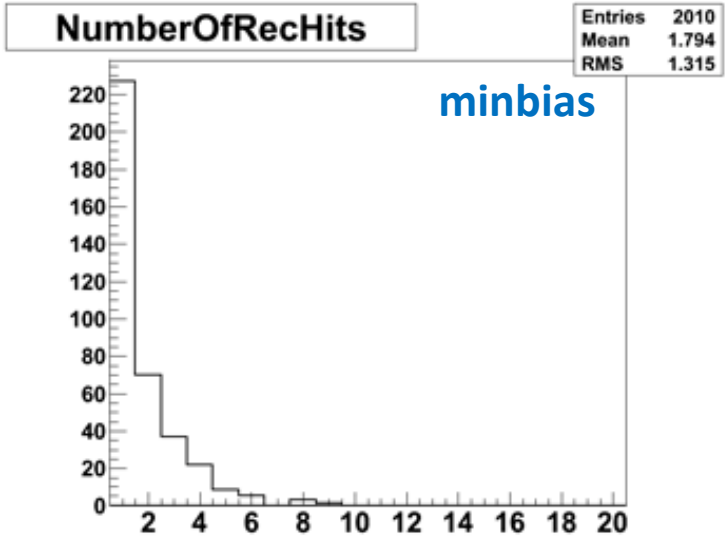
  - p-p minbias (2000 events)

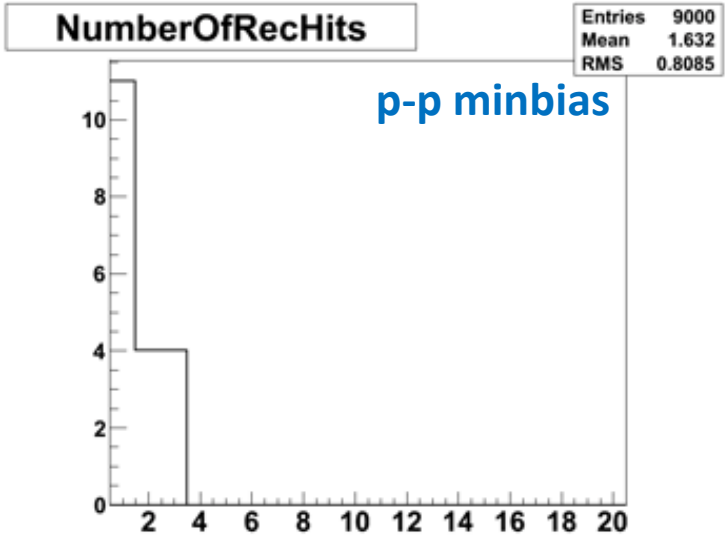
rfio:/castor/cern.ch/cms/store/relval/CMSSW_3_1_0/RelValProdMinBias/GEN-SIM-RAW/MC_31X_V1-v1/

- How to process (after Raw to Digi)
  - Download CMSSW_3_1_0 source code from cvs : DQM/RPCMonitorDigi , DQM/RPCMonitorClient
  - cmsRun DQM/RPCMonitorDigi/python/dqm_digi.py

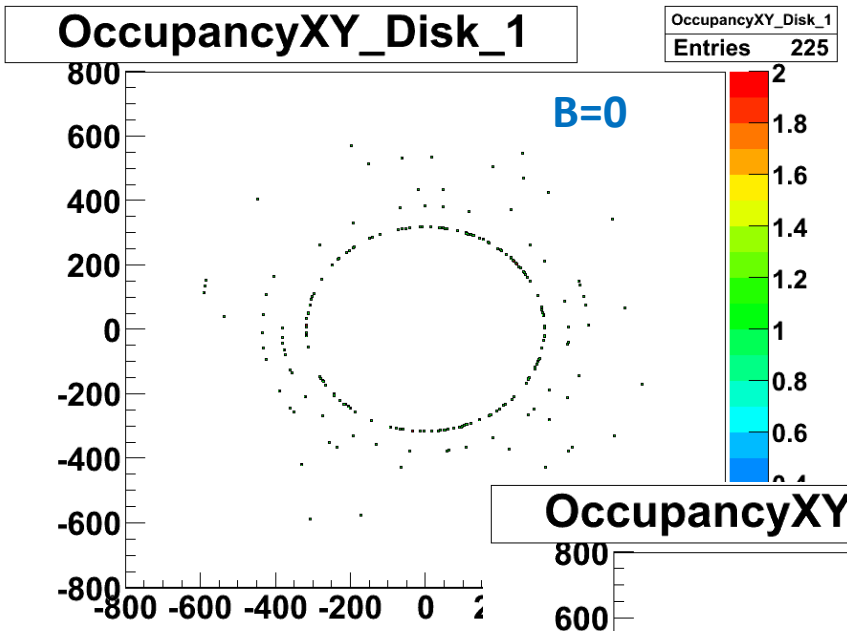
Number of rechits / 2000 events

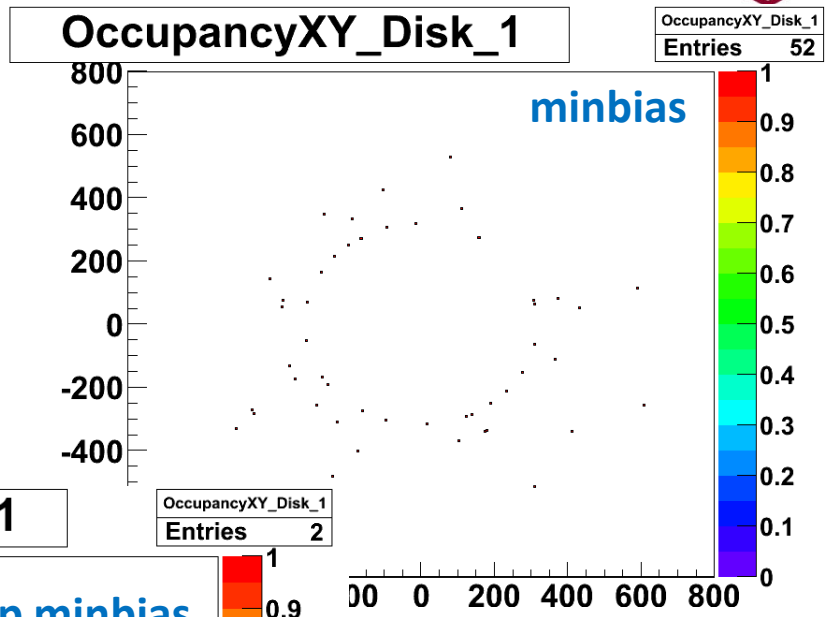


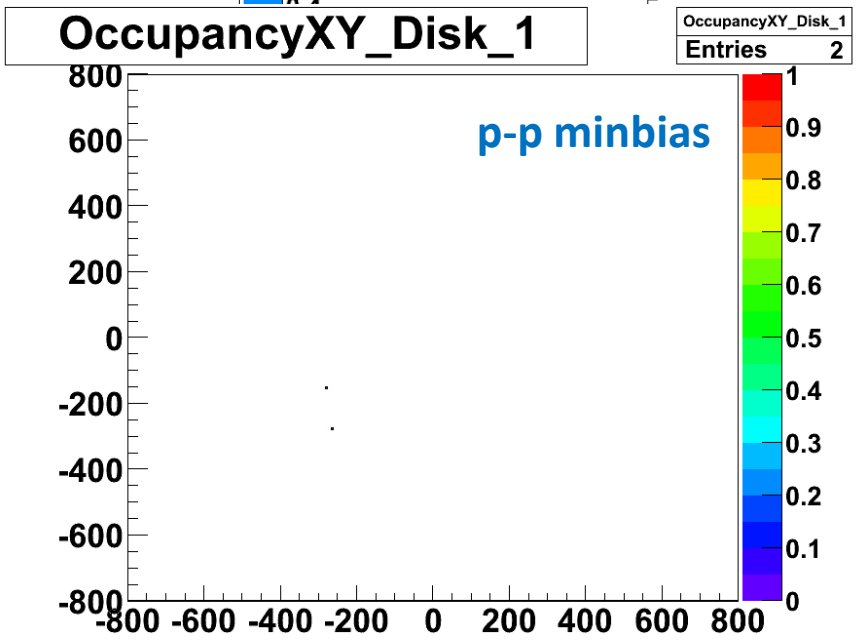




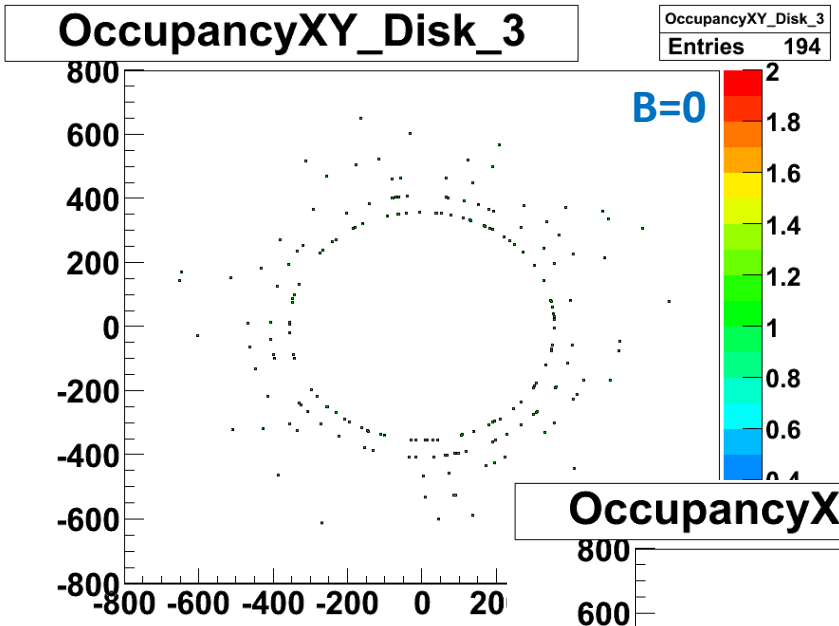
Occupancy for endcap / 2000 events

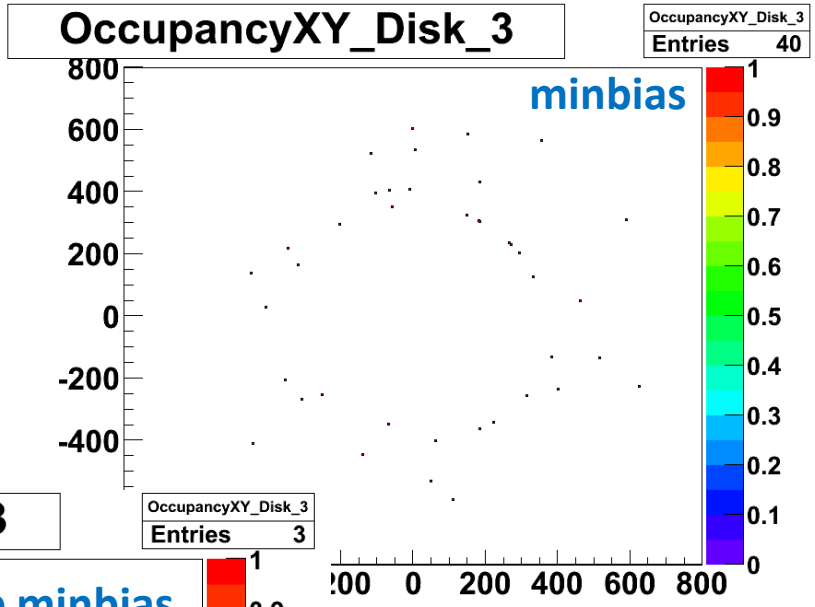


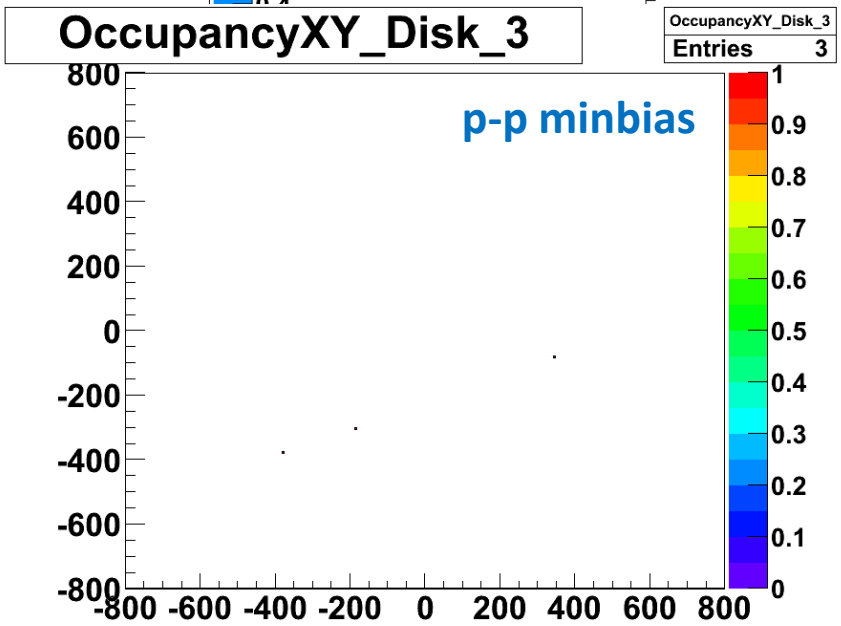




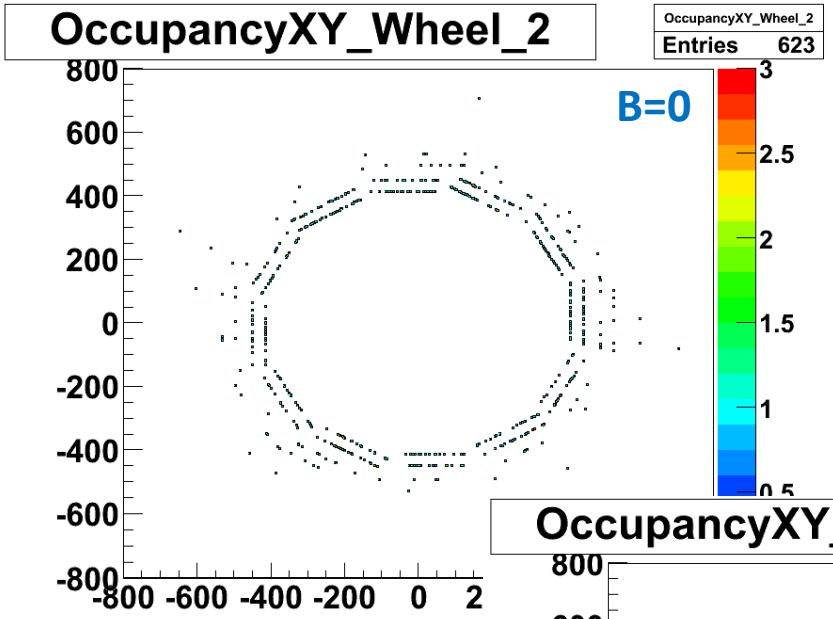
Occupancy for endcap / 2000 events

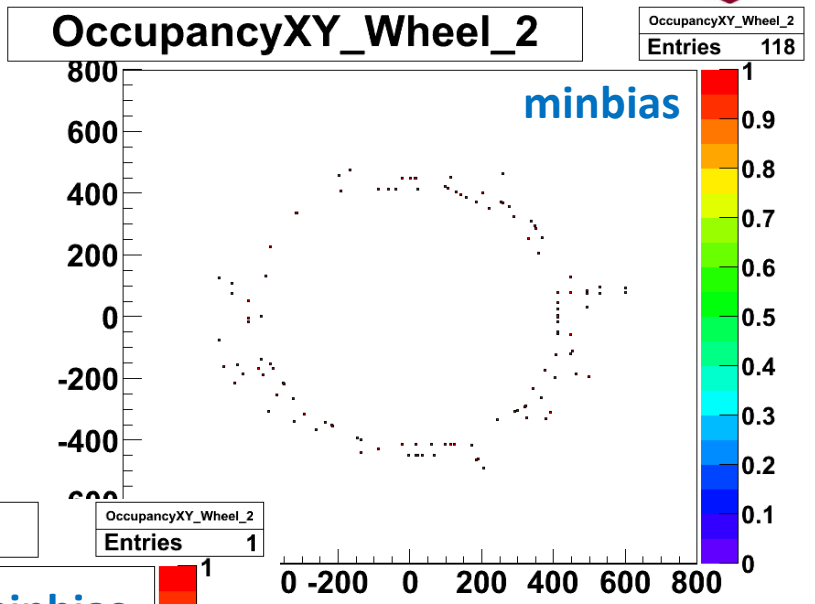


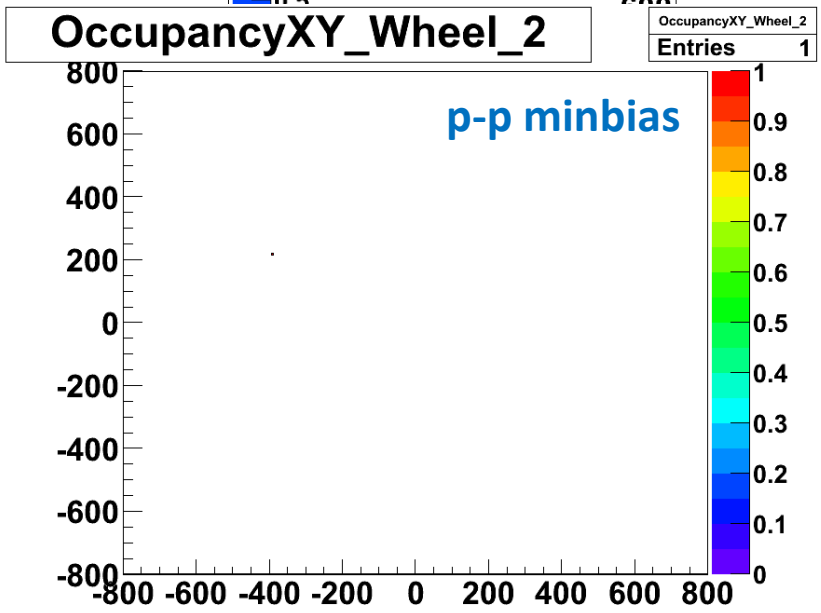




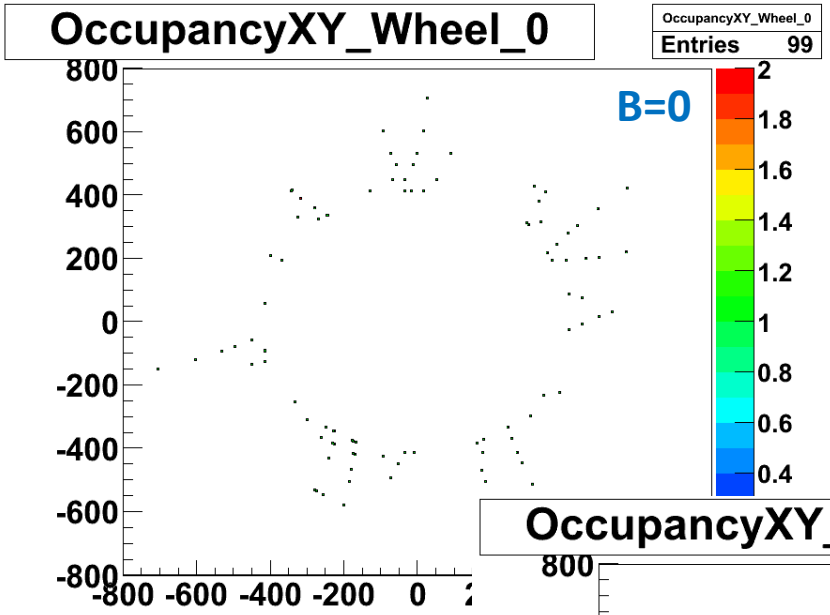
Occupancy for barrel / 2000 events

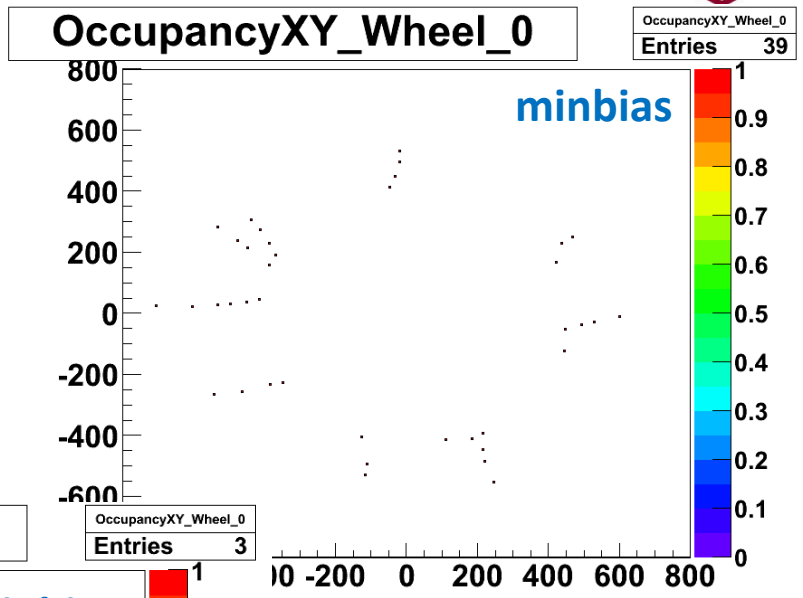


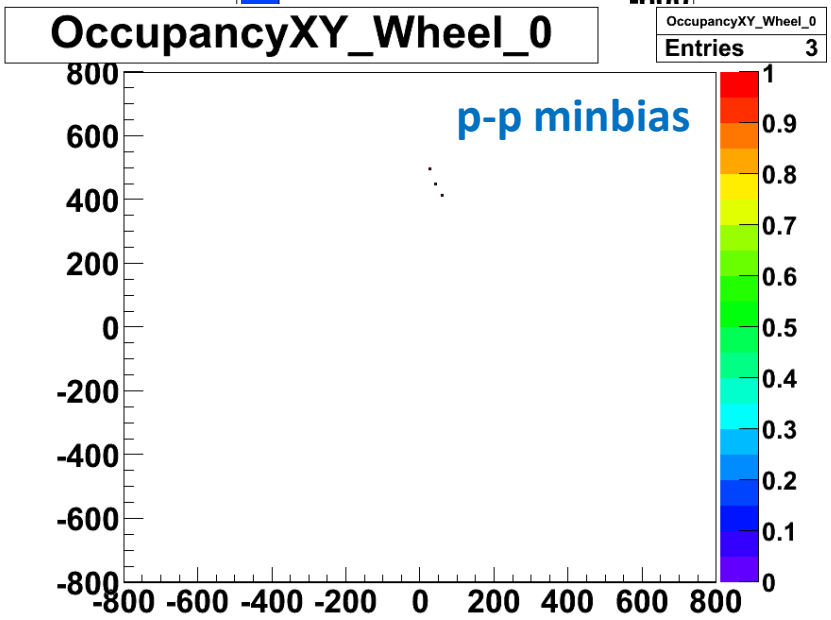




Occupancy for barrel / 2000 events







Summary

- Get more information & occupancy plots
  https://twiki.cern.ch/twiki/bin/view/CMS/RPCdetValidationHI
  http://cmsdoc.cern.ch/~miheejo/RPC_readiness/
- Forward region
  - In the higher eta region the occupancy is higher
- Barrel region
  - In the lowest stations (RB1) the occupancy is higher
- Heavy ion events have higher occupancy than p-p events
- For RPC systems, data taking for heavy ion has no problem