MC Production of Single Muon & Analysis

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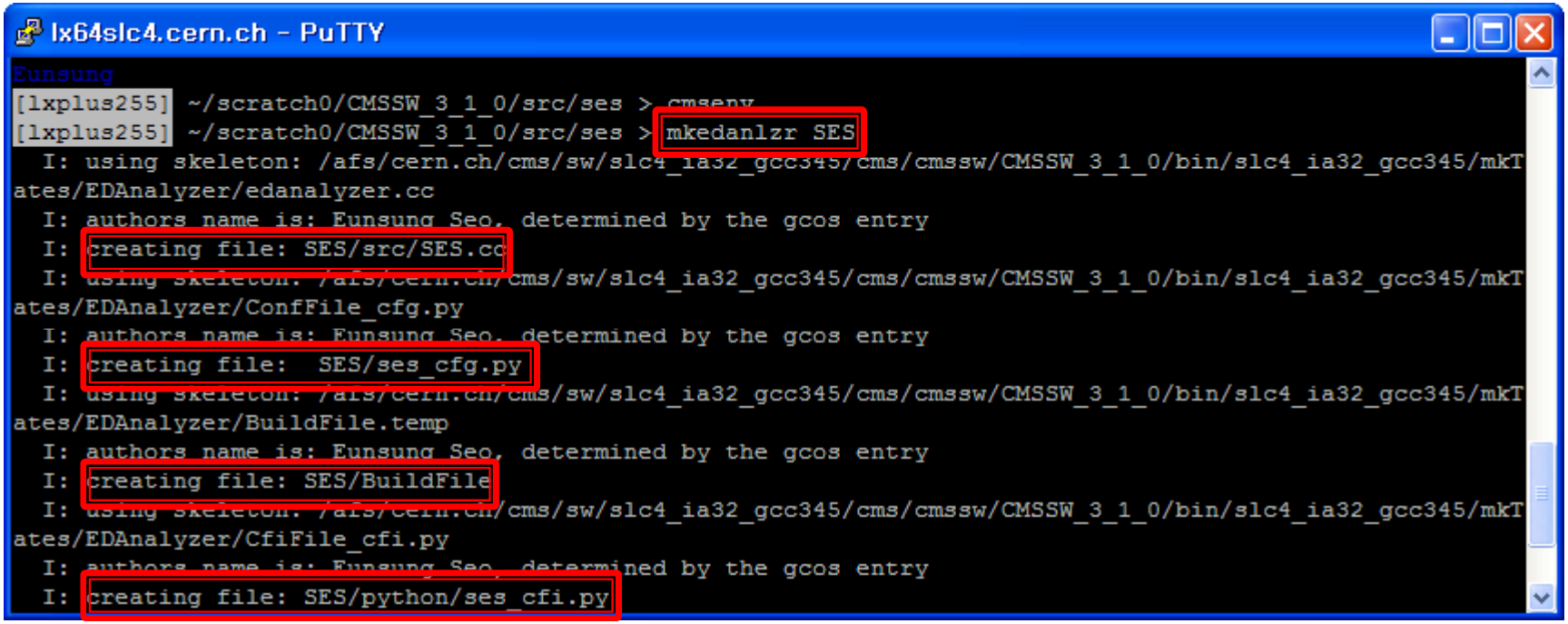
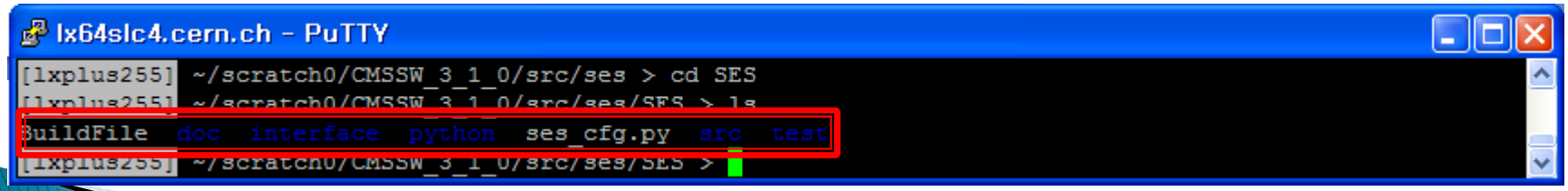
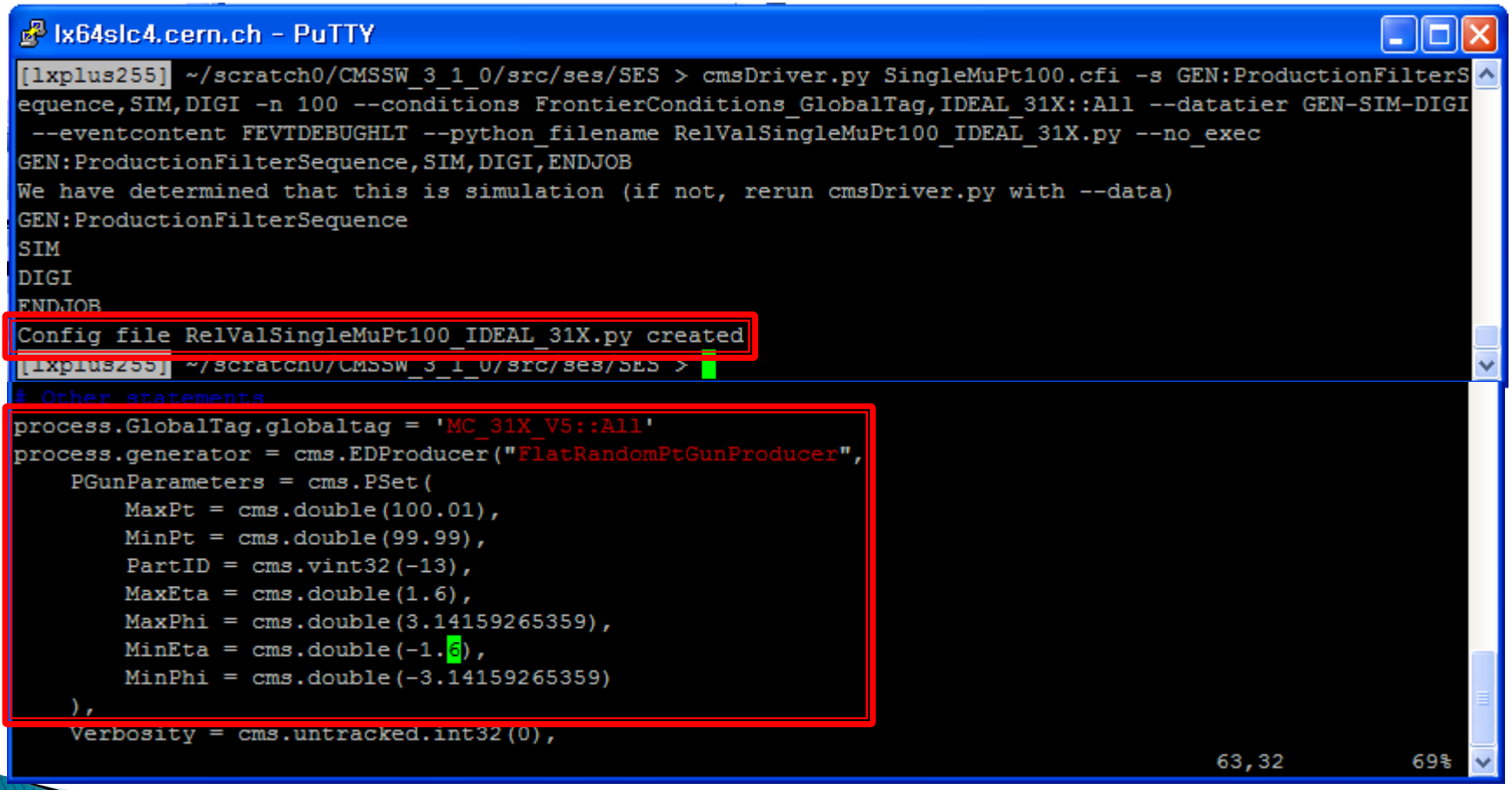
Construction of Analyzer

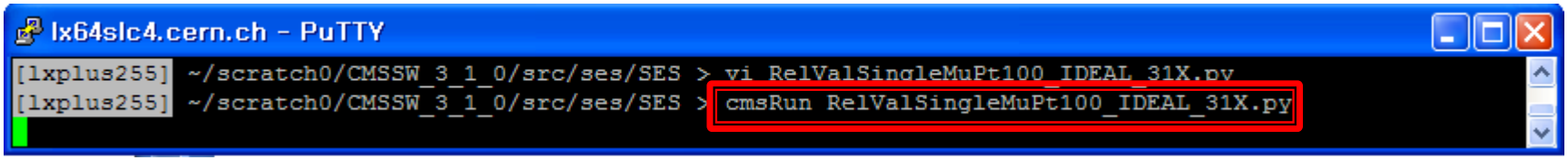


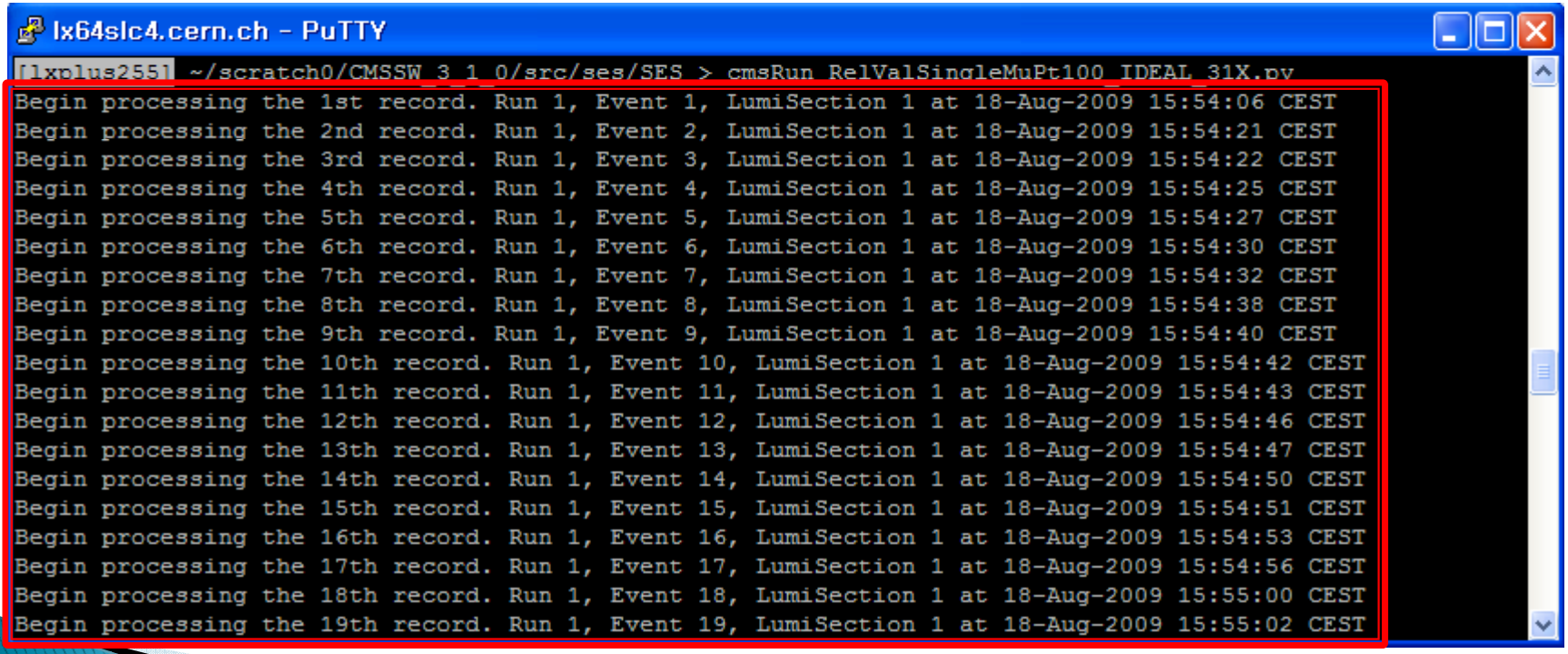


MC Production of Single Muon by Particle Gun



MC Production of Single Muon by Particle Gun

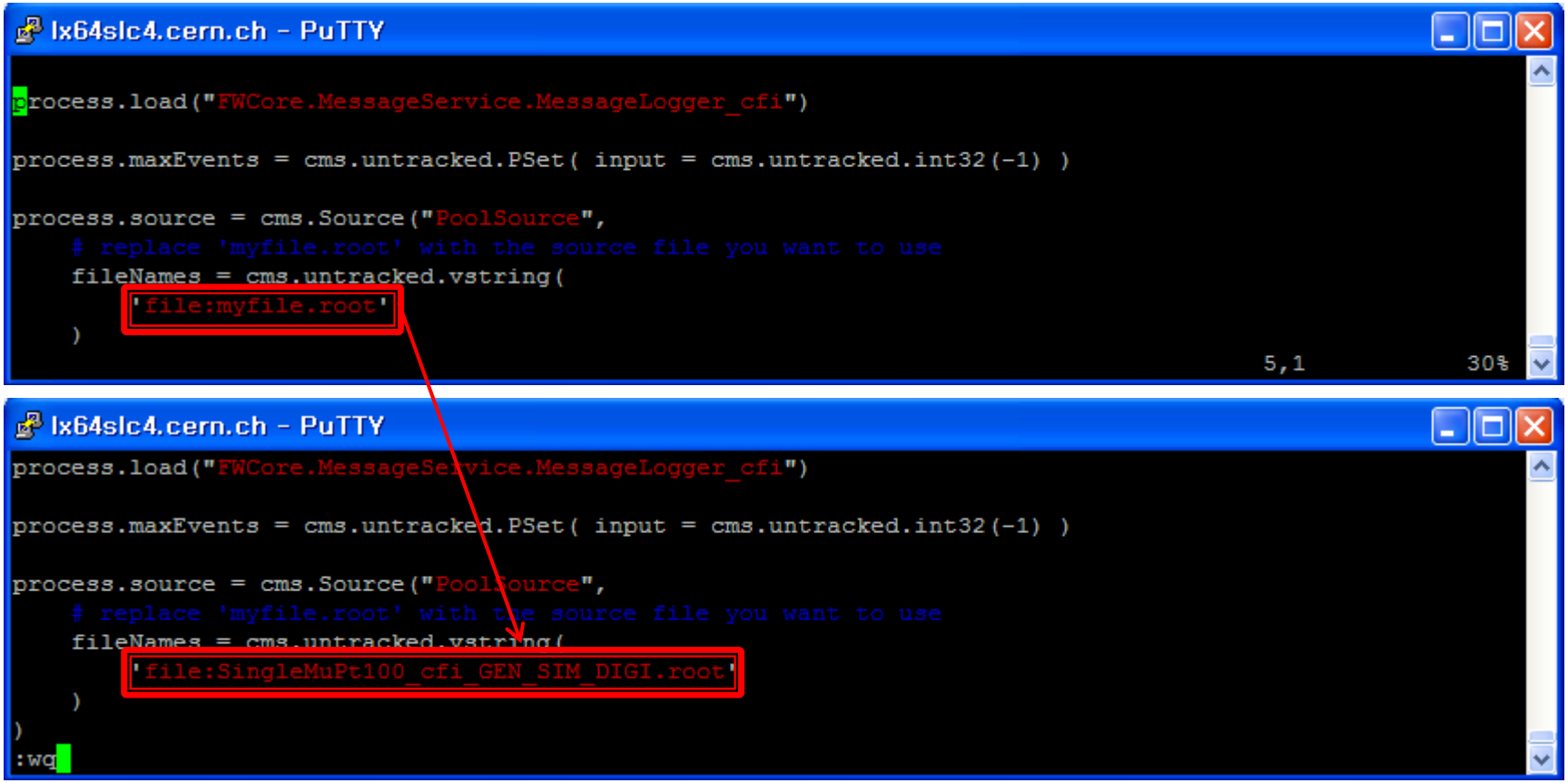




Analysis of RPC Digi

- /CMSSW/DQM/RPCMonitorDigi/src/RPCMonitorDigi.cc
- Edit to ses_cfg.py
- Edit to BuildFile
- Edit to /src/SES.cc

Analysis of RPC Digi



Analysis of RPC Digi

lx64slc4.cern.ch - PuTTY

```
// user include files
#include "FWCore/Framework/interface/Frameworkfwd.h"
#include "FWCore/Framework/interface/EDAnalyzer.h"
#include "DataFormats/RPCDigi/interface/RPCDigiCollection.h"
#include "DataFormats/RPCDigi/interface/RPCDigi.h"
#include "FWCore/Framework/interface/Event.h"
"SES.cc" 120L, 2346C written                                  24,21         19%
```

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```
void
SES::analyze(const edm::Event& iEvent, const edm::EventSetup& iSetup)
{
   using namespace edm;

   Handle<RPCDigiCollection> rpcdigis;
   iEvent.getByType(rpcdigis);

  for( RPCDigiCollection::DigiRangeIterator collectionItr=rpcdigis->begin(); collectionItr!=rpcdigis->en
d(); ++collectionItr){
    RPCDetId detId=(*collectionItr).first;
    std::cout<<"<detId"<<detId<<">"<<std::endl;
        }
}
                                                              98,0-1        86%
```

Analysis of RPC Digi

Analysis of RPC Digi

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```
Begin processing the 94th record. Run 1, Event 94, LumiSection 1 at 18-Aug-2009 17:12:18 CEST
<detId Re 0 Ri 0 St 1 Se 4 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 1 Se 10 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 1 Se 4 La 2 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 1 Se 10 La 2 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 2 Se 4 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 2 Se 10 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 2 Se 4 La 2 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 2 Se 10 La 2 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 3 Se 4 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 3 Se 10 La 1 Su 2 Ro 3 Tr 0 >
<detId Re 0 Ri 0 St 4 Se 10 La 1 Su 2 Ro 3 Tr 0 >
Begin processing the 95th record. Run 1, Event 95, LumiSection 1 at 18-Aug-2009 17:12:18 CEST
<detId Re 0 Ri 1 St 1 Se 4 La 1 Su 1 Ro 1 Tr 0 >
<detId Re 0 Ri -1 St 1 Se 9 La 1 Su 1 Ro 1 Tr 0 >
<detId Re 0 Ri 1 St 1 Se 4 La 2 Su 1 Ro 1 Tr 0 >
<detId Re 0 Ri 1 St 2 Se 4 La 1 Su 1 Ro 1 Tr 0 >
<detId Re 0 Ri -1 St 2 Se 10 La 1 Su 1 Ro 2 Tr 0 >
<detId Re 0 Ri 1 St 2 Se 4 La 2 Su 1 Ro 1 Tr 0 >
<detId Re 0 Ri -1 St 2 Se 10 La 2 Su 1 Ro 1 Tr 0 >
<detId Re 0 Ri 1 St 3 Se 4 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri -1 St 3 Se 10 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri -1 St 4 Se 10 La 1 Su 1 Ro 3 Tr 0 >
<detId Re 0 Ri 1 St 4 Se 4 La 1 Su 2 Ro 3 Tr 0 >
Begin processing the 96th record. Run 1, Event 96, LumiSection 1 at 18-Aug-2009 17:12:18 CEST
<detId Re 0 Ri -2 St 1 Se 5 La 1 Su 1 Ro 1 Tr 0 >
```

Analysis of RPC Digi

lx64slc4.cern.ch - PuTTY

```
// ------------ method called to for each event  ------------
void
SES::analyze(const edm::Event& iEvent, const edm::EventSetup& iSetup)
{
   using namespace edm;

  Handle<RPCDigiCollection> rpcdigis;
  iEvent.getByType(rpcdigis);

for( RPCDigiCollection::DigiRangeIterator collectionItr=rpcdigis->begin(); collectionItr!=rpcdigis->end(
); ++collectionItr){
       RPCDetId detId=(*collectionItr).first;
       std::cout<<"<detId="<<detId<<">"<<std::endl;

for (RPCDigiCollection::const_iterator digiItr =(*collectionItr ).second.first;digiItr != (*collectionIt
r ).second.second; ++digiItr){
       int strip= (*digiItr).strip();
       int bx=(*digiItr).bx();

       std::cout<<"<strip="<<strip<<">"<<"<bx="<<bx<<">"<<std::endl;
                }
        }
}
                                                                    82,0-1        85%
```

Analysis of RPC Digi

lx64slc4.cern.ch - PuTTY

```
<strip=47><bx=0>
<strip=48><bx=0>
Begin processing the 98th record. Run 1, Event 98, LumiSection 1 at 18-Aug-2009 18:01:36 CEST
<detId= Re 1 Ri 2 St 1 Se 2 La 1 Su 2 Ro 1 Tr 0 >
<strip=14><bx=0>
<strip=15><bx=0>
<strip=16><bx=0>
<detId= Re -1 Ri 2 St 1 Se 5 La 1 Su 2 Ro 1 Tr 0 >
<strip=5><bx=0>
<strip=6><bx=0>
<detId= Re 1 Ri 2 St 2 Se 2 La 1 Su 2 Ro 1 Tr 0 >
<strip=17><bx=0>
<strip=18><bx=0>
<detId= Re -1 Ri 2 St 2 Se 5 La 1 Su 2 Ro 1 Tr 0 >
<strip=7><bx=0>
<detId= Re -1 Ri 3 St 3 Se 5 La 1 Su 1 Ro 2 Tr 0 >
<strip=4><bx=0>
<detId= Re 1 Ri 3 St 3 Se 2 La 1 Su 2 Ro 2 Tr 0 >
<strip=16><bx=0>
<detId= Re -1 Ri 3 St 3 Se 5 La 1 Su 2 Ro 2 Tr 0 >
<strip=25><bx=0>
Begin processing the 99th record. Run 1, Event 99, LumiSection 1 at 18-Aug-2009 18:01:36 CEST
<detId= Re 0 Ri -2 St 1 Se 1 La 1 Su 1 Ro 1 Tr 0 >
<strip=30><bx=0>
<detId= Re 0 Ri 2 St 1 Se 7 La 1 Su 1 Ro 1 Tr 0 >
<strip=53><bx=0>
```

Analysis of SIM Hit(Particle Id)

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```
#include "FWCore/Framework/interface/EDAnalyzer.h"
#include "DataFormats/RPCDigi/interface/RPCDigiCollection.h"
#include "DataFormats/RPCDigi/interface/RPCDigi.h"
#include "SimDataFormats/TrackingHit/interface/PSimHitContainer.h"
#include "FWCore/Framework/interface/Event.h"
                                                    29,66         21%
```

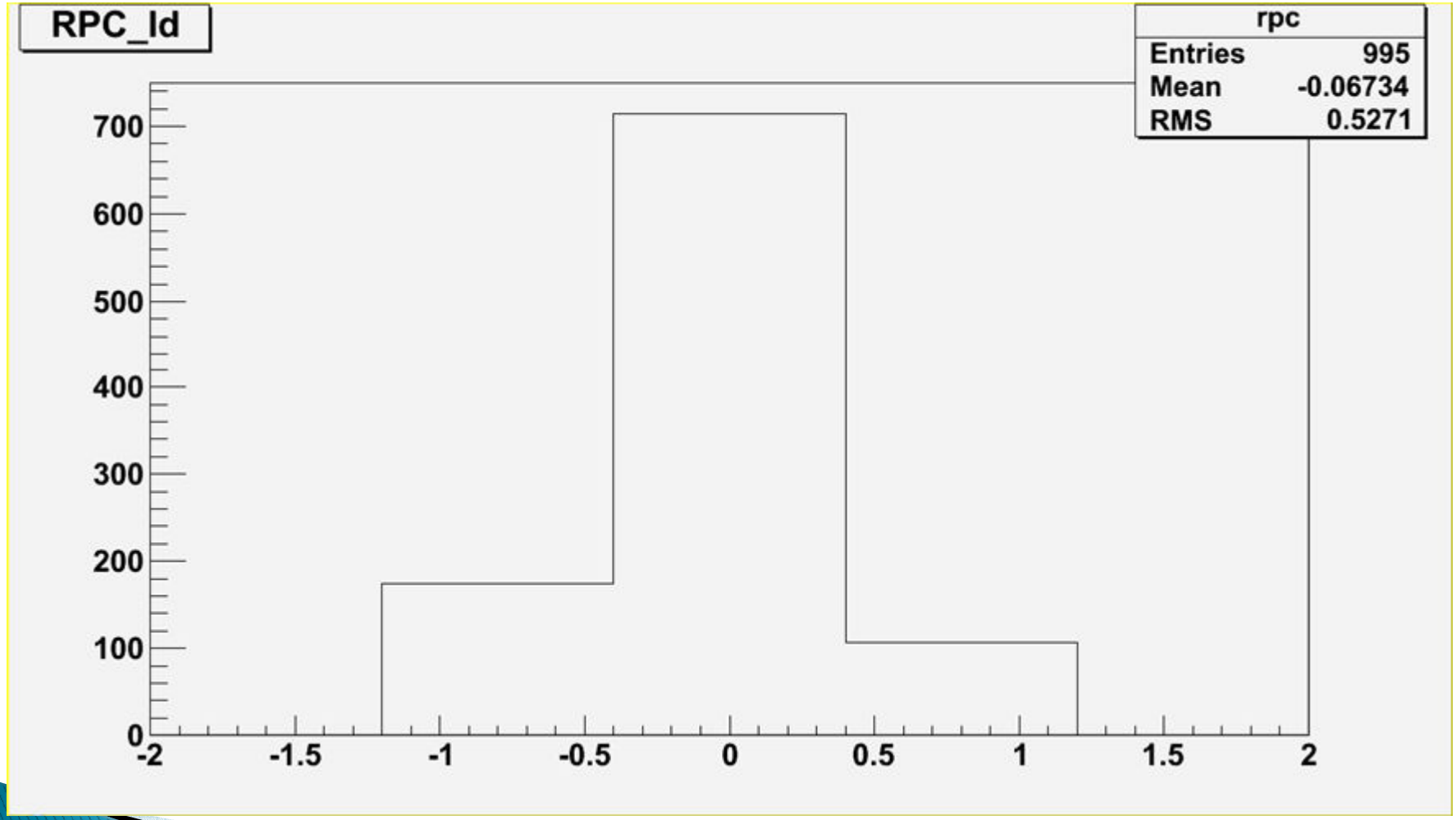
lx64slc4.cern.ch - PuTTY

```
edm::Handle<PSimHitContainer> simHit;
event.getByLabel("g4SimHits", "MuonRPCHits", simHit);
```

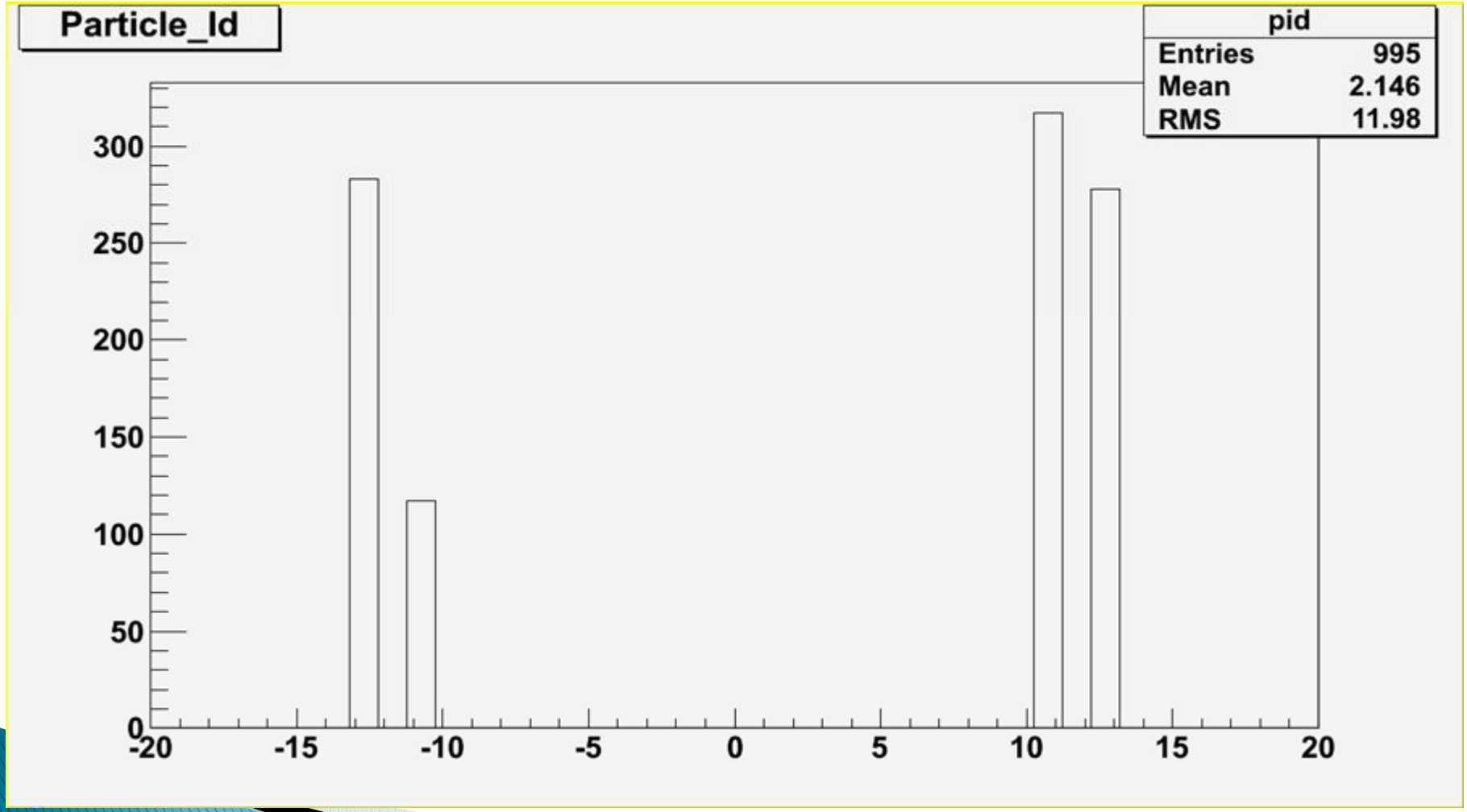
lx64slc4.cern.ch - PuTTY

```
  // Loop on simhits

  PSimHitContainer::const_iterator simIt;
//    RPCRecHitCollection::const_iterator recIt;
//    int clsize = (*recIt).clusterSize();

  //loop

  for (simIt = simHit->begin(); simIt != simHit->end(); simIt++) {
    RPCDetId Rsid = (RPCDetId)(*simIt).detUnitId();
//     const RPCRoll* soll = dynamic_cast<const RPCRoll* >( rpcGeom->roll(Rsid));
    int ptype = simIt->particleType();

    std::cout<<"Detector Id="<<Rsid<<">"<<std::endl;
    std::cout<<"Parcicle Type="<<ptype<<std::endl;
        }
                                                    110,20        87%
```

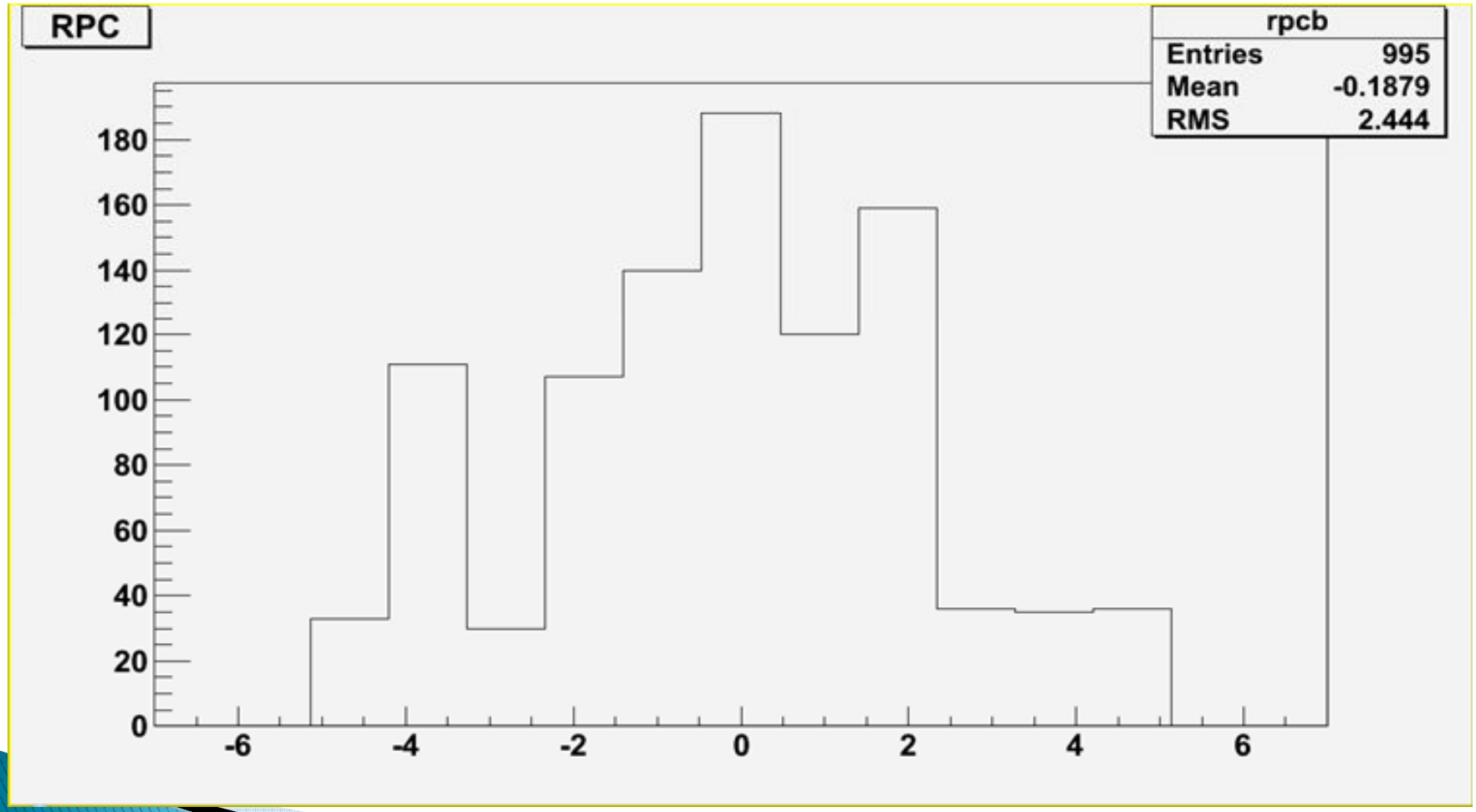
Histogram (Sim Hit) Sim_region



Histogram (Sim Hit) particle id



Histogram Sim-detecter Id (Endcap-station,barrel-wheel)



Analysis of RecHit & Geometry

lx64slc4.cern.ch - PuTTY

```
#include "FWCore/Framework/interface/EDAnalyzer.h"
#include "DataFormats/RPCDigi/interface/RPCDigiCollection.h"
#include "DataFormats/RPCDigi/interface/RPCDigi.h"

#include "SimDataFormats/TrackingHit/interface/PSimHitContainer.h"

#include "DataFormats/GeometryVector/interface/LocalPoint.h"
#include "DataFormats/GeometryVector/interface/GlobalPoint.h"

#include "Geometry/RPCGeometry/interface/RPCGeometry.h"

#include "DataFormats/RPCRecHit/interface/RPCRecHitCollection.h"

#include "FWCore/Framework/interface/Event.h"
#include "FWCore/Framework/interface/MakerMacros.h"
"src/SES.cc" 168L, 4048C written                              37,64         16%
```

lx64slc4.cern.ch - PuTTY

```
Handle<RPCRecHitCollection> recHit;
iEvent.getByLabel("rpcRecHits", recHit);

edm::ESHandle<RPCGeometry> rpcGeom;
iSetup.get<MuonGeometryRecord>().get(rpcGeom);

                                                              108,1         68%
```

Analysis of RecHit & Geometry

lx64slc4.cern.ch - PuTTY

```
process.maxEvents = cms.untracked.PSet( input = cms.untracked.int32(10) )
#process.maxEvents = cms.untracked.PSet( input = cms.untracked.int32(-1) )

process.source = cms.Source("PoolSource",
    # replace 'myfile.root' with the source file you want to use
    fileNames = cms.untracked.vstring(
        'file:step2_RAW2DIGI_RECO_POSTRECO.root'
    )
)

process.demo = cms.EDAnalyzer('SES'
)
```

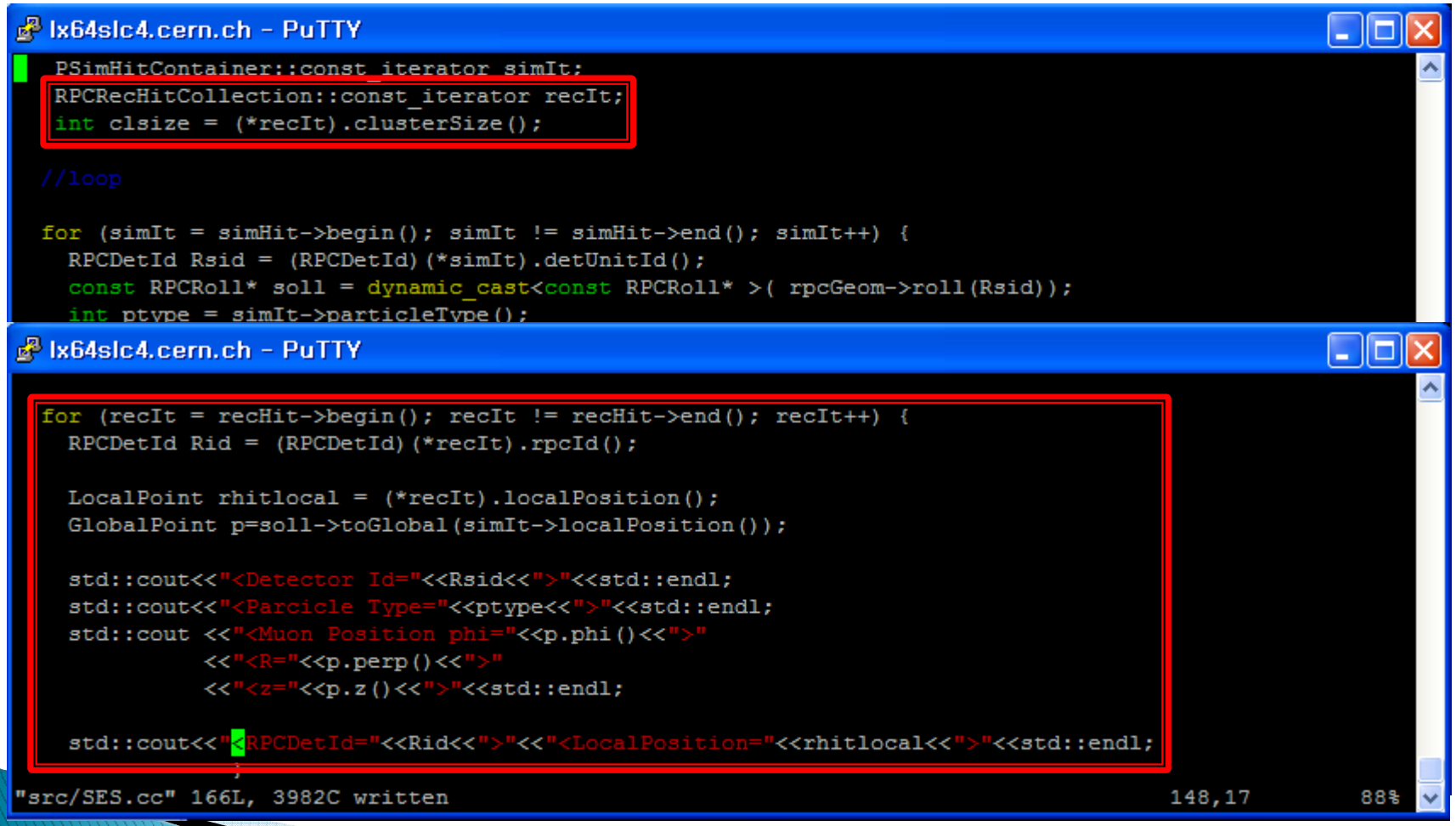
13,47 85%

lx64slc4.cern.ch - PuTTY

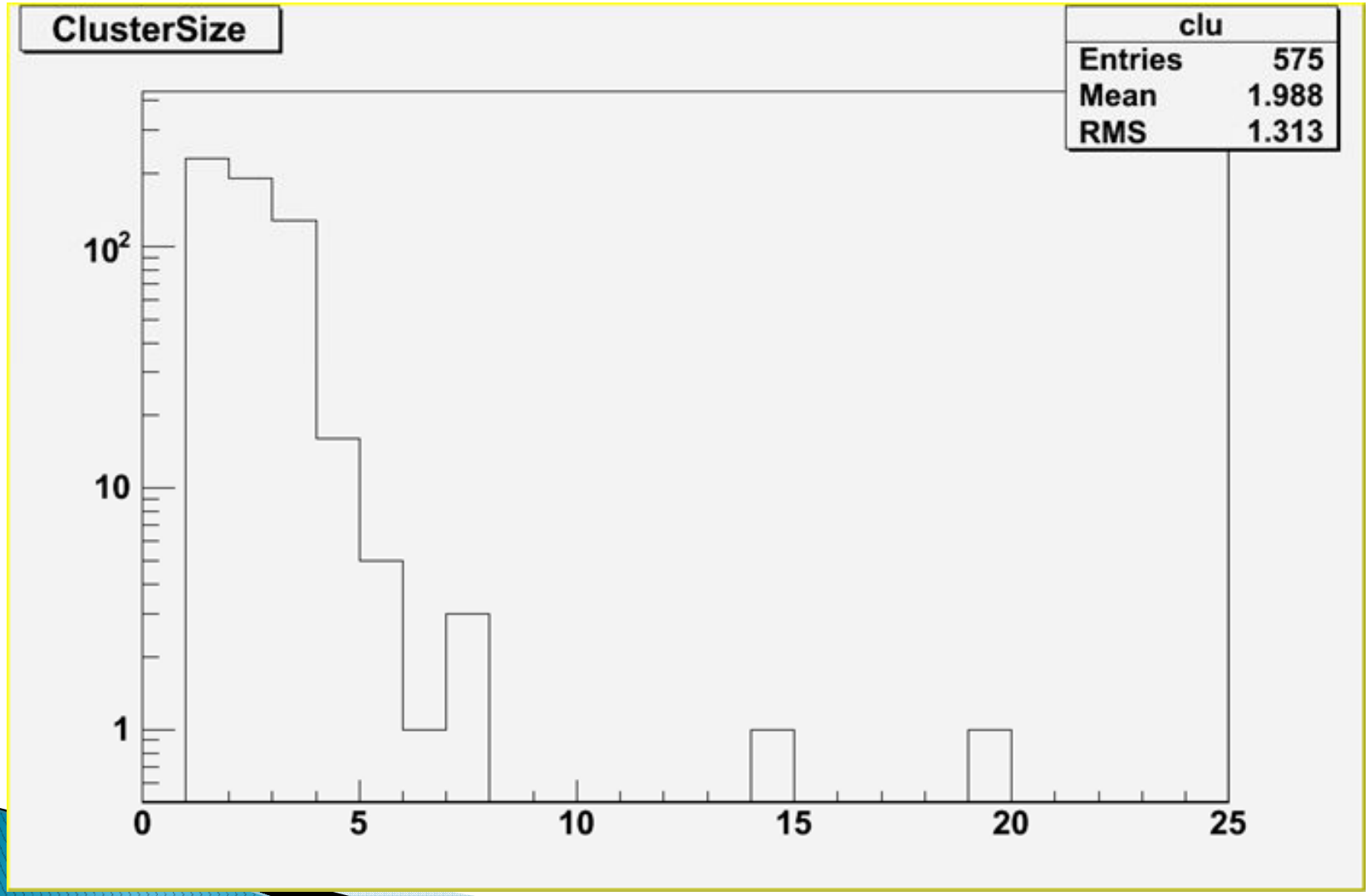
```
for (recIt = recHit->begin(); recIt != recHit->end(); recIt++) {
  RPCDetId Rid = (RPCDetId)(*recIt).rpcId();

  LocalPoint rhitlocal = (*recIt).localPosition();
  GlobalPoint p=soll->toGlobal(simIt->localPosition());
  ClSize->Fill(clsize);

  std::cout<<"Detector Id="<<Rsid<<">"<<std::endl;
  std::cout<<"Parcicle Type="<<ptype<<std::endl;
      }
```

135,0-1 89%

Analysis of RecHit & Geometry



Histogram (RecHit)
Rec-cluster size



Future Plan

- Study CMSSW, ROOT, C++
- More Understanding about
  Kinematics of muon
- Join to DPG group, Develop these methods
  & Apply to real muon data