Kalman Fitting on Low Momentum

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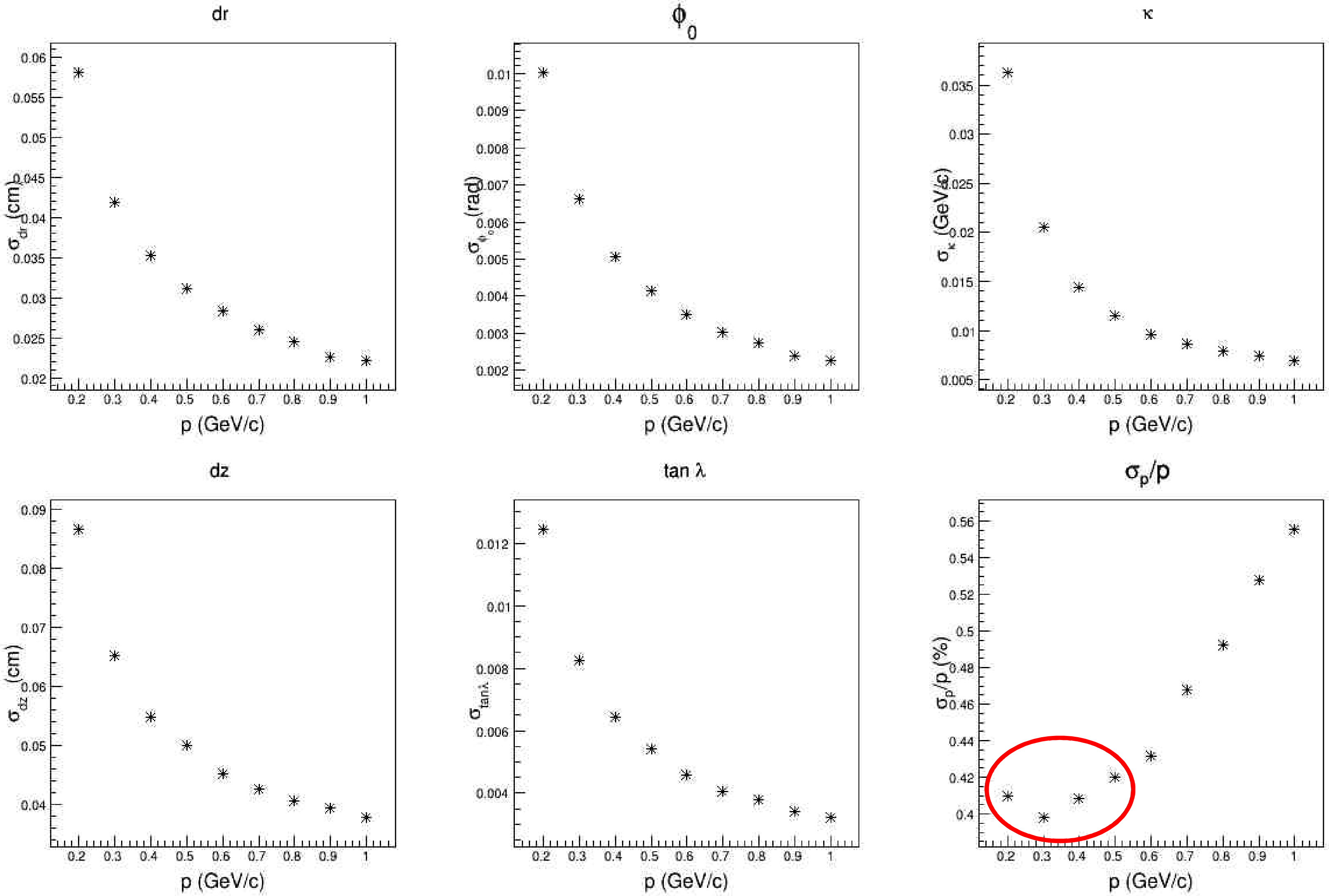
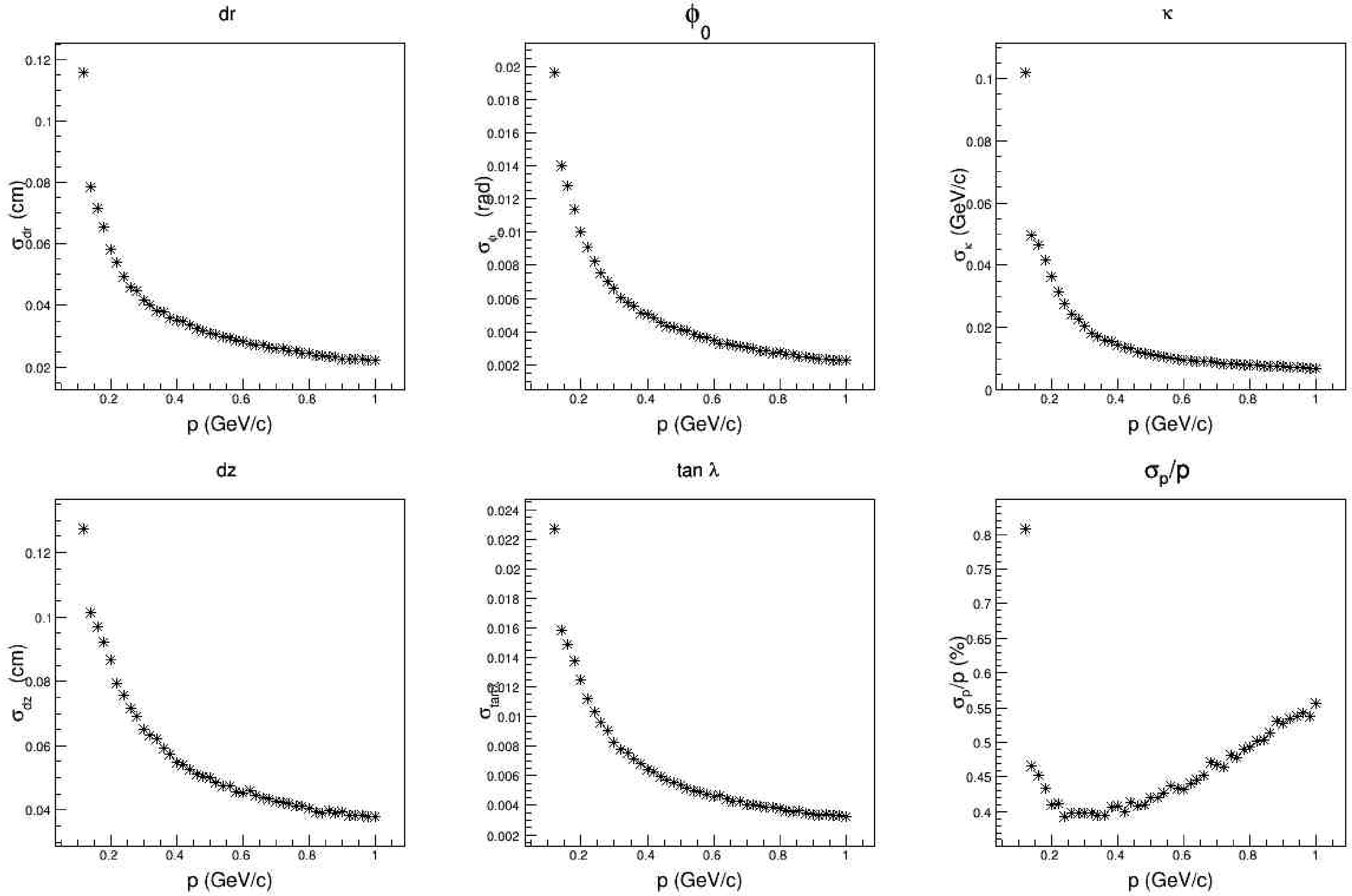
Resolution of Helix Parameter and Momentum(0.2 to 1.0 GeV/c)



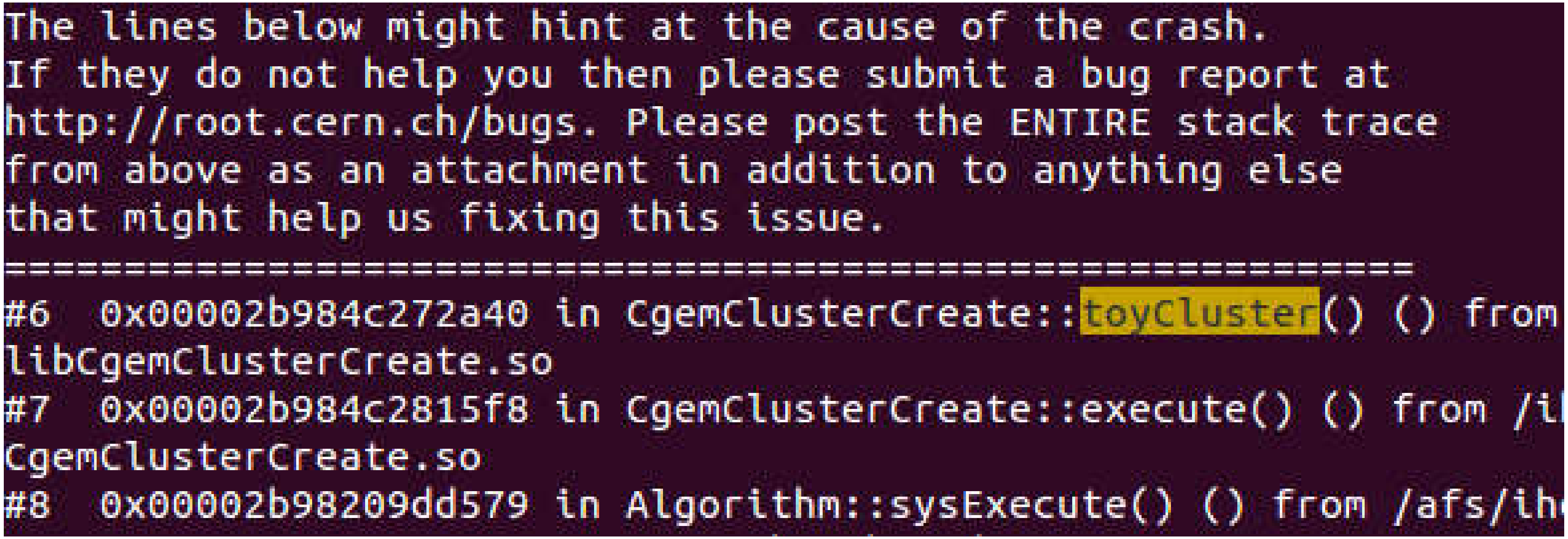
0.12 ~ 1.0 GeV/c , $\Delta p = 20\ MeV/c$



Note: please ignore the first point

Problem

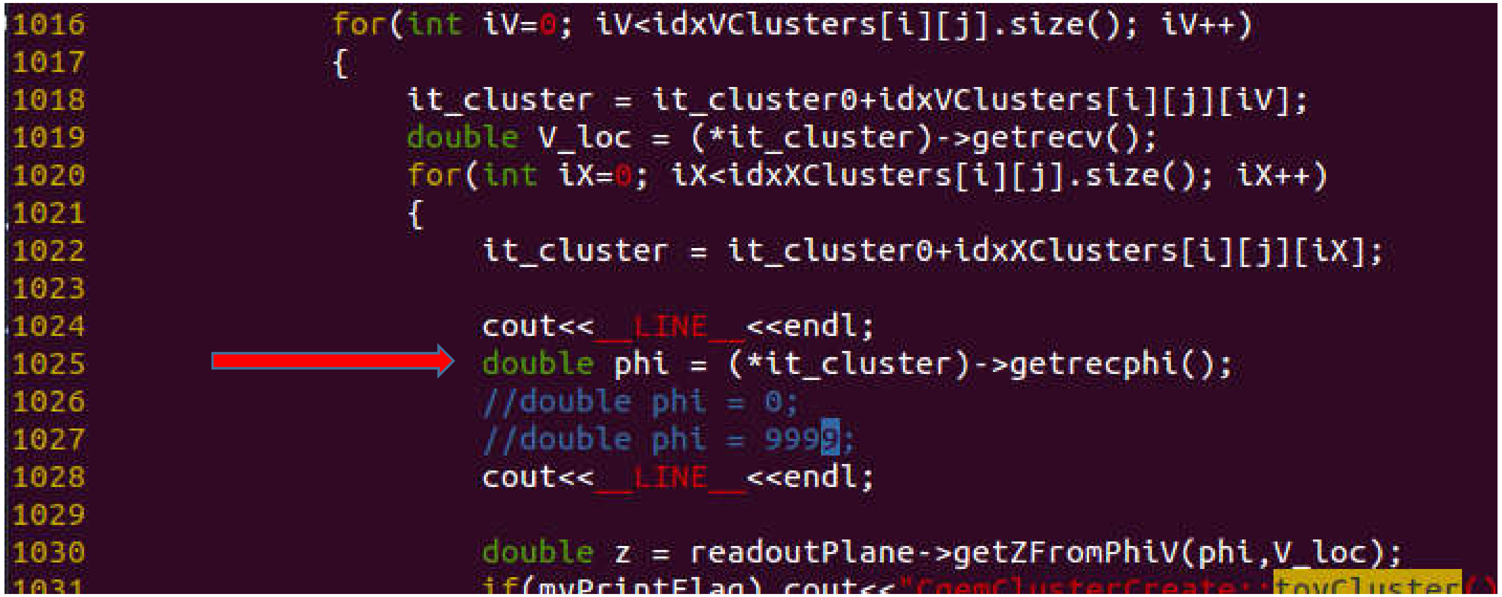
- Reconstruction of Cluster fail on $p = 0.4GeV/c$ and $p = 0.8GeV/c$ for the $toyCluster()$ method.



```
The lines below might hint at the cause of the crash.
If they do not help you then please submit a bug report at
http://root.cern.ch/bugs. Please post the ENTIRE stack trace
from above as an attachment in addition to anything else
that might help us fixing this issue.
===========================================================
#6  0x00002b984c272a40 in CgemClusterCreate::toyCluster() () from
libCgemClusterCreate.so
#7  0x00002b984c2815f8 in CgemClusterCreate::execute() () from /il
CgemClusterCreate.so
#8  0x00002b98209dd579 in Algorithm::sysExecute() () from /afs/ih
```

The Program Crash and Stop Here

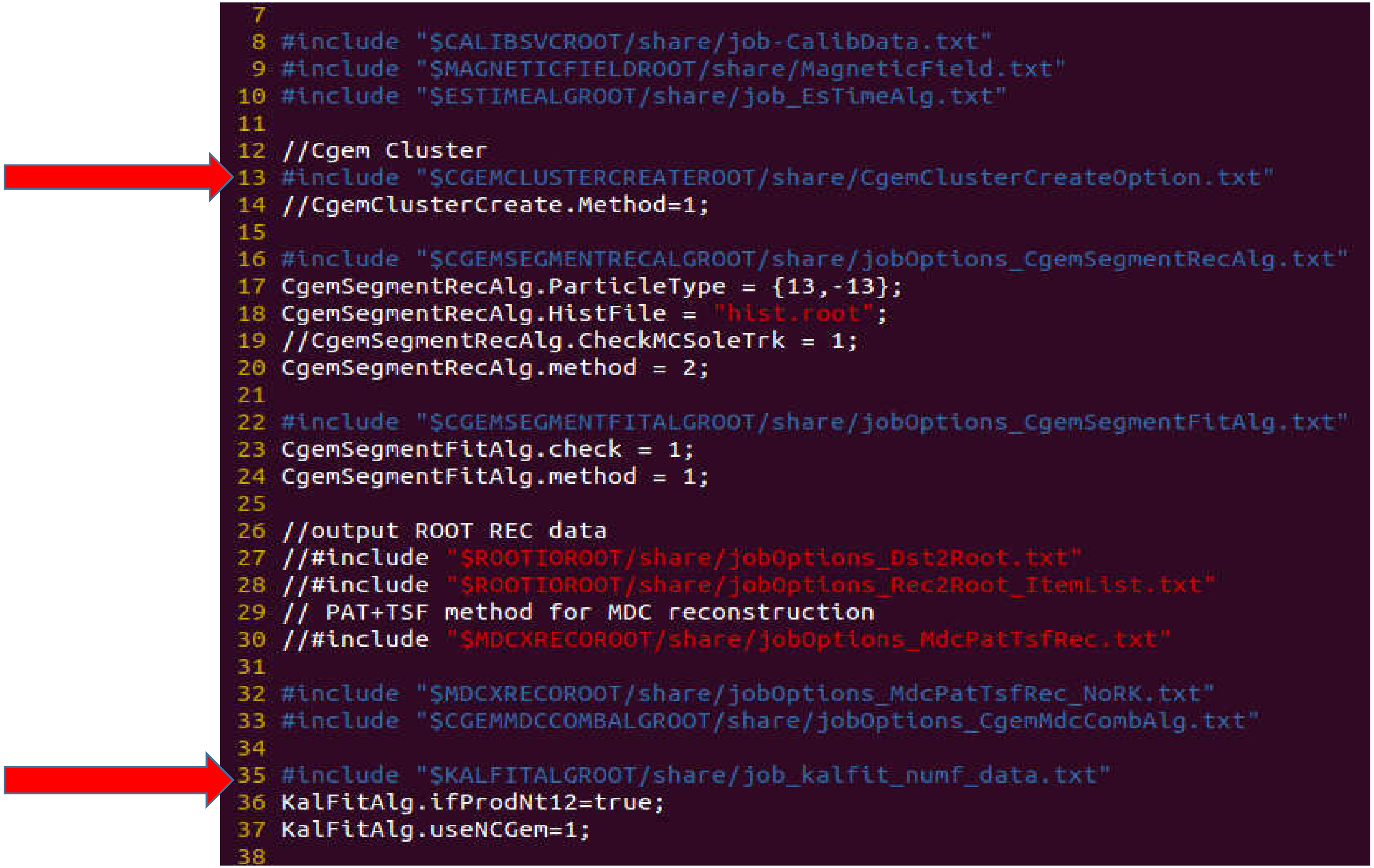
- *CgemClusterCreate* / *src* / *CgemClusterCreate.cxx*



```
for(int iV=0; iV<idxVClusters[i][j].size(); iV++)
{
    it_cluster = it_cluster0+idxVClusters[i][j][iV];
    double V_loc = (*it_cluster)->getrecv();
    for(int iX=0; iX<idxXClusters[i][j].size(); iX++)
    {
        it_cluster = it_cluster0+idxXClusters[i][j][iX];

        cout<<__LINE__<<endl;
        double phi = (*it_cluster)->getrecphi();
        //double phi = 0;
        //double phi = 9999;
        cout<<__LINE__<<endl;

        double z = readoutPlane->getZFromPhiV(phi,V_loc);
        if(myPrintFlag) cout<<"CgemClusterCreate::toyCluster()
```

1. The program crash only if the CgemMcHit number is more than 3. (normally CgemMcHit number is 3)
2. The program crash on different Event for different phi value (e.g. phi = 0 and phi =9999)

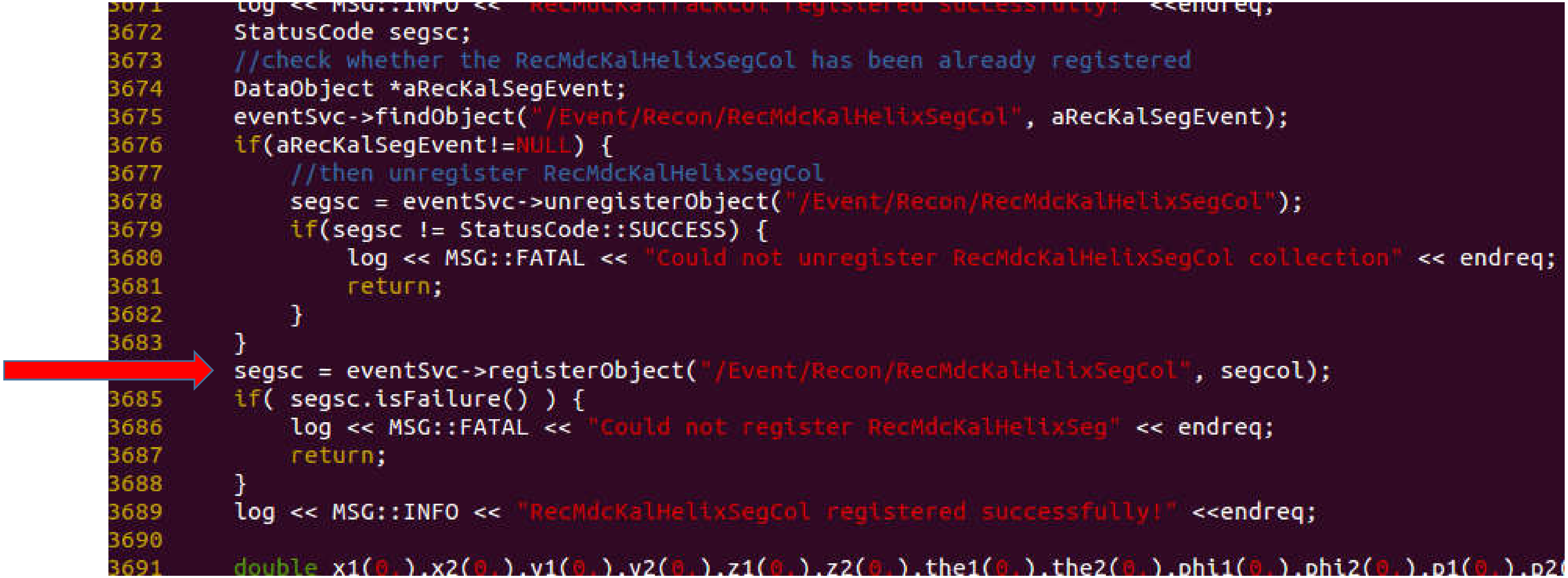
The Crash Depends on Another Uncorrelated Algorithem



```

#include "$CALIBSVCROOT/share/job-CalibData.txt"
#include "$MAGNETICFIELDROOT/share/MagneticField.txt"
#include "$ESTIMEALGROOT/share/job_EsTimeAlg.txt"

//Cgem Cluster
#include "$CGEMCLUSTERCREATEROOT/share/CgemClusterCreateOption.txt"
//CgemClusterCreate.Method=1;

#include "$CGEMSEGMENTRECALGROOT/share/jobOptions_CgemSegmentRecAlg.txt"
CgemSegmentRecAlg.ParticleType = {13,-13};
CgemSegmentRecAlg.HistFile = "hist.root";
//CgemSegmentRecAlg.CheckMCSoleTrk = 1;
CgemSegmentRecAlg.method = 2;

#include "$CGEMSEGMENTFITALGROOT/share/jobOptions_CgemSegmentFitAlg.txt"
CgemSegmentFitAlg.check = 1;
CgemSegmentFitAlg.method = 1;

//output ROOT REC data
//#include "$ROOTIOROOT/share/jobOptions_Dst2Root.txt"
//#include "$ROOTIOROOT/share/jobOptions_Rec2Root_ItemList.txt"
// PAT+TSF method for MDC reconstruction
//#include "$MDCXRECOROOT/share/jobOptions_MdcPatTsfRec.txt"

#include "$MDCXRECOROOT/share/jobOptions_MdcPatTsfRec_NoRK.txt"
#include "$CGEMMDCCOMBALGROOT/share/jobOptions_CgemMdcCombAlg.txt"

#include "$KALFITALGROOT/share/job_kalfit_numf_data.txt"
KalFitAlg.ifProdNt12=true;
KalFitAlg.useNCGem=1;

```

The Code That Cause the Crash

KalFitAlg / *src* / *KalFitAlg.cxx*



```
    log << MSG::INFO << "RecMdcKalTrackCol registered successfully!" <<endreq;
    StatusCode segsc;
    //check whether the RecMdcKalHelixSegCol has been already registered
    DataObject *aRecKalSegEvent;
    eventSvc->findObject("/Event/Recon/RecMdcKalHelixSegCol", aRecKalSegEvent);
    if(aRecKalSegEvent!=NULL) {
        //then unregister RecMdcKalHelixSegCol
        segsc = eventSvc->unregisterObject("/Event/Recon/RecMdcKalHelixSegCol");
        if(segsc != StatusCode::SUCCESS) {
            log << MSG::FATAL << "Could not unregister RecMdcKalHelixSegCol collection" << endreq;
            return;
        }
    }
    segsc = eventSvc->registerObject("/Event/Recon/RecMdcKalHelixSegCol", segcol);
    if( segsc.isFailure() ) {
        log << MSG::FATAL << "Could not register RecMdcKalHelixSeg" << endreq;
        return;
    }
    log << MSG::INFO << "RecMdcKalHelixSegCol registered successfully!" <<endreq;

    double x1(0.),x2(0.),y1(0.),y2(0.),z1(0.),z2(0.),the1(0.),the2(0.),phi1(0.),phi2(0.),p1(0.),p2(
```

Solution

- ? ? ?