Progress Report

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Important:

The *ddsim* output file used to analyse the effect of changes in *EICrecon* had the following configurations:

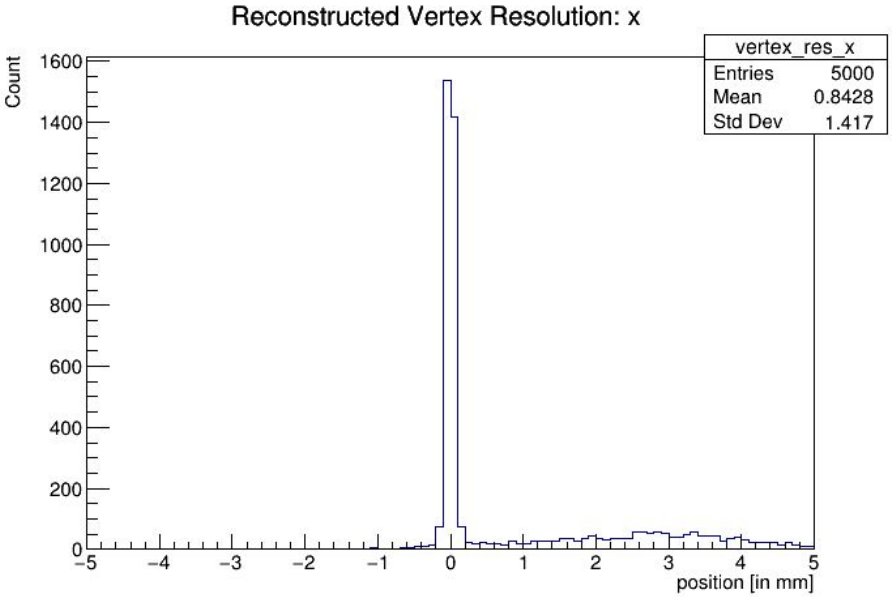
- Particle Thrown: Muon
- Number of Events: 5000
- Gun Multiplicity i.e. Muons thrown per event: 10
- Distribution used: uniform, so it will be flat in theta
- Min. Muon Momentum: 0 GeV
- Max. Muon Momentum: 10 GeV
- Gun Direction: (0.000 0.000 1.000) //default
- Gun Position: (3.000 4.000 5.000) *vertex position*
- Compact File: $DETECTOR_PATH/$DETECTOR_CONFIG.xml

Changes done:

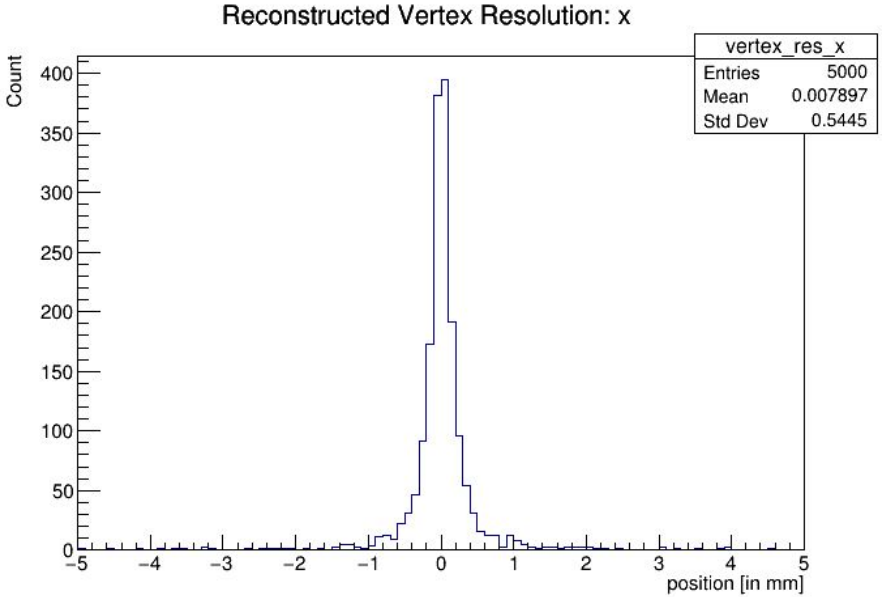
```
// define line surface for local position values
auto perigee = Acts::Surface::makeShared<Acts::PerigeeSurface>(Acts::Vector3(0,0,0));

// track particle back to transverse point-of-closest approach
// with respect to the defined line surface

auto linesurface_parameter = -(v.x*p.x + v.y*p.y)/(p.x*p.x + p.y*p.y);


auto xpca = v.x + linesurface_parameter*p.x;
auto ypca = v.y + linesurface_parameter*p.y;
auto zpca = v.z + linesurface_parameter*p.z;

Acts::Vector3 global(xpca, ypca, zpca);

// convert from global to local coordinates using the defined line surface
Acts::Vector2 localpos;
Acts::Vector3 direction(sin(theta)*cos(phi), sin(theta)*sin(phi), cos(theta));
auto local = perigee->globalToLocal(m_geoSvc->getActsGeometryContext(), global, direction);

if(!local.ok())
{
    continue;
}

localpos = local.value();

// Insert into edm4eic::TrackParameters, which uses numerical values in its specified units
auto track_parameter = track_parameters->create();
track_parameter.setType(-1); // type --> seed(-1)
track_parameter.setLoc({(float)localpos(0), (float)localpos(1)}); // 2d location on surface [mm]
```

Comparison: Vertex Resolution

default

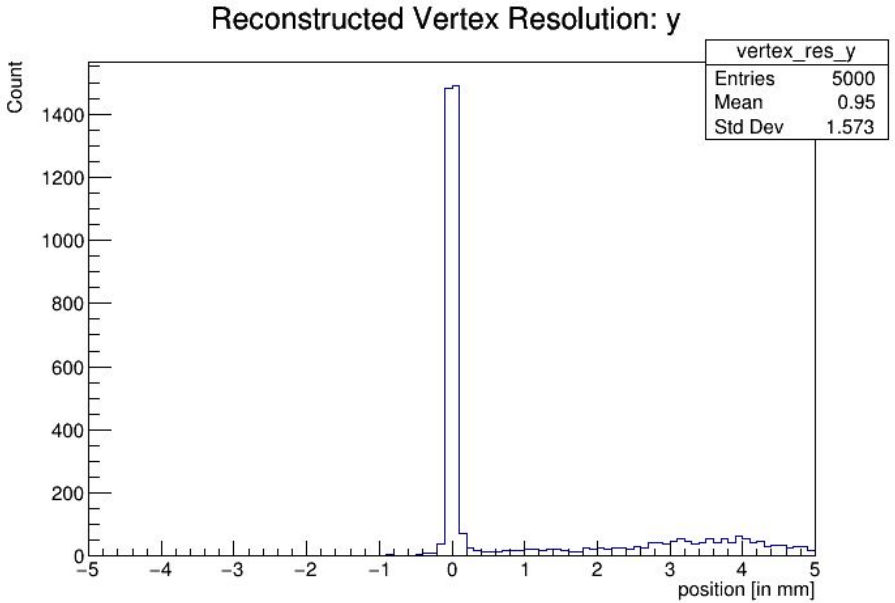


changed

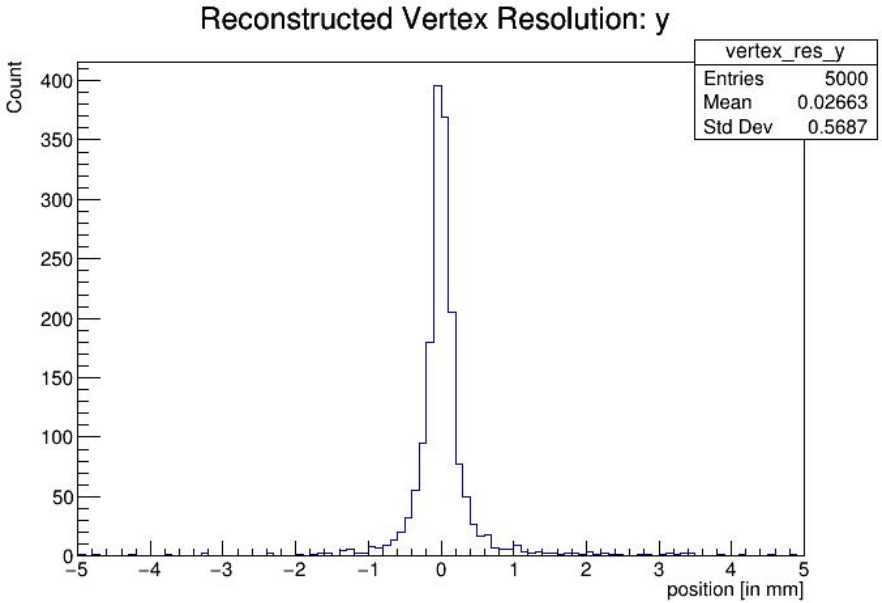


Comparison: Vertex Resolution

default

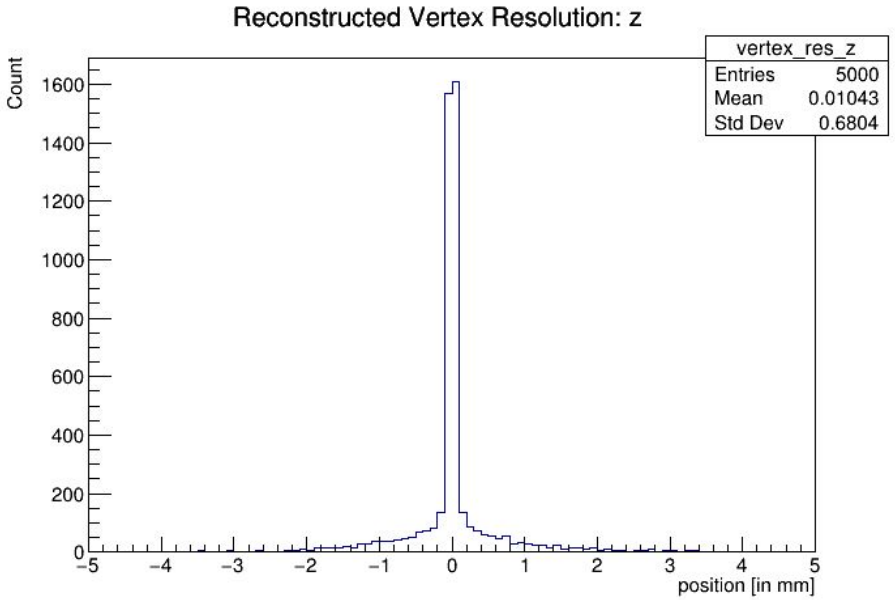


changed

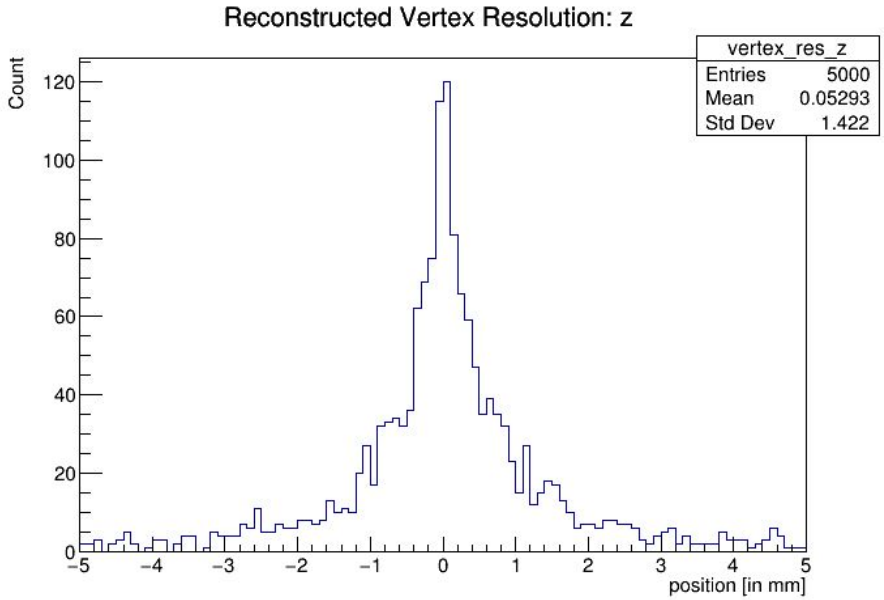


Comparison: Vertex Resolution

default

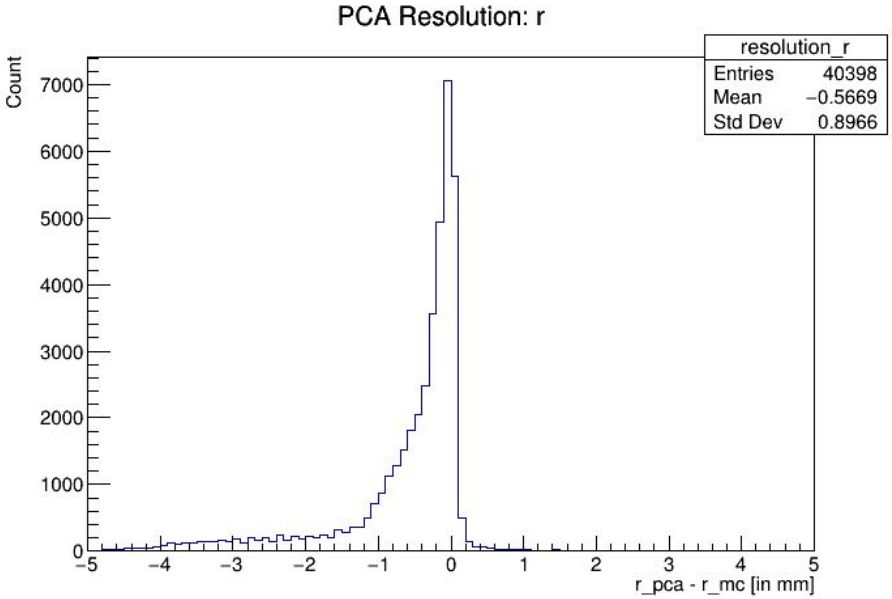


changed

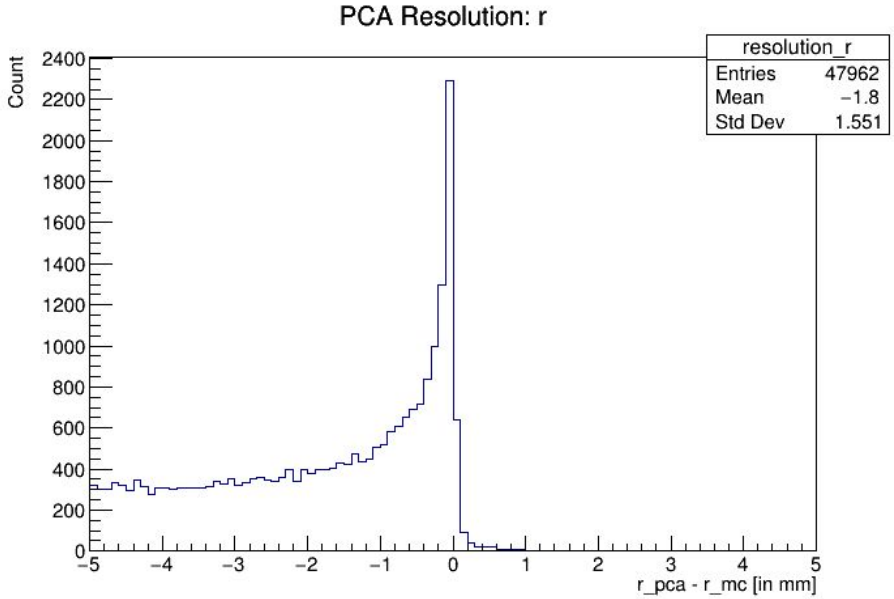


Comparison: PCA Resolution r

default

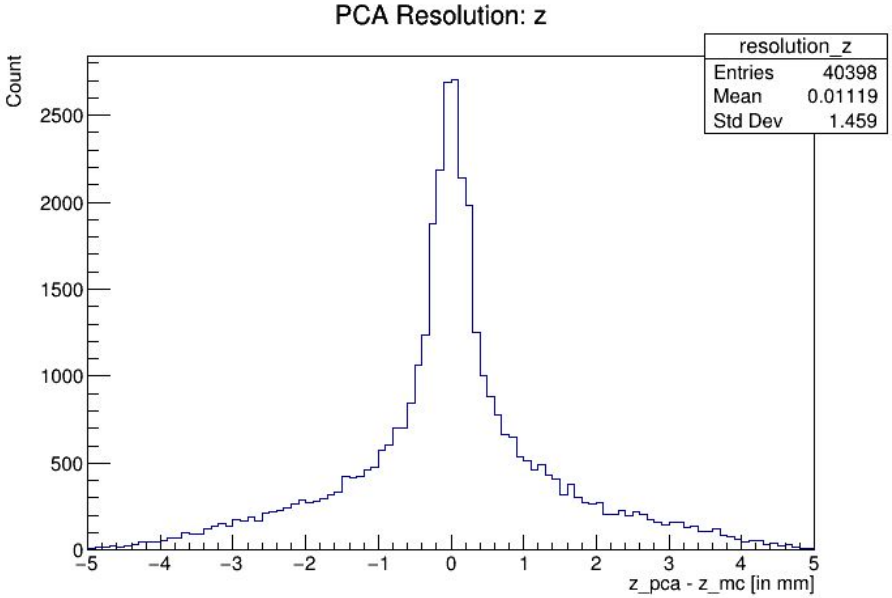


changed

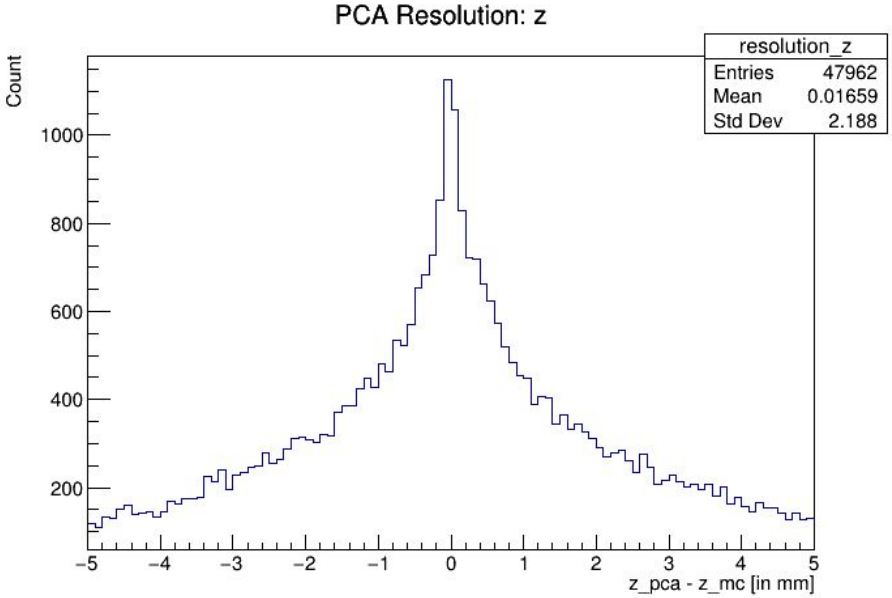


Comparison: PCA Resolution z

default

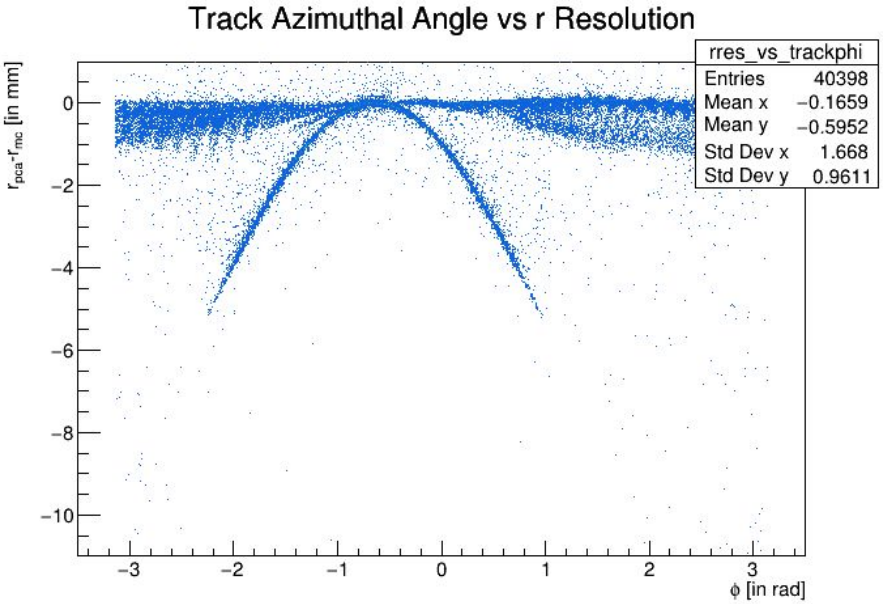


changed

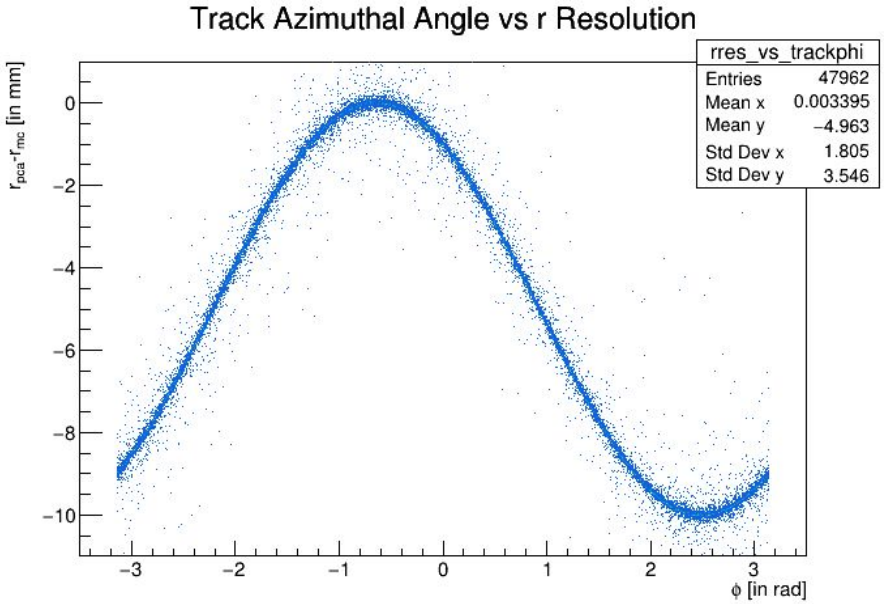


Comparison: Track phi vs r

default

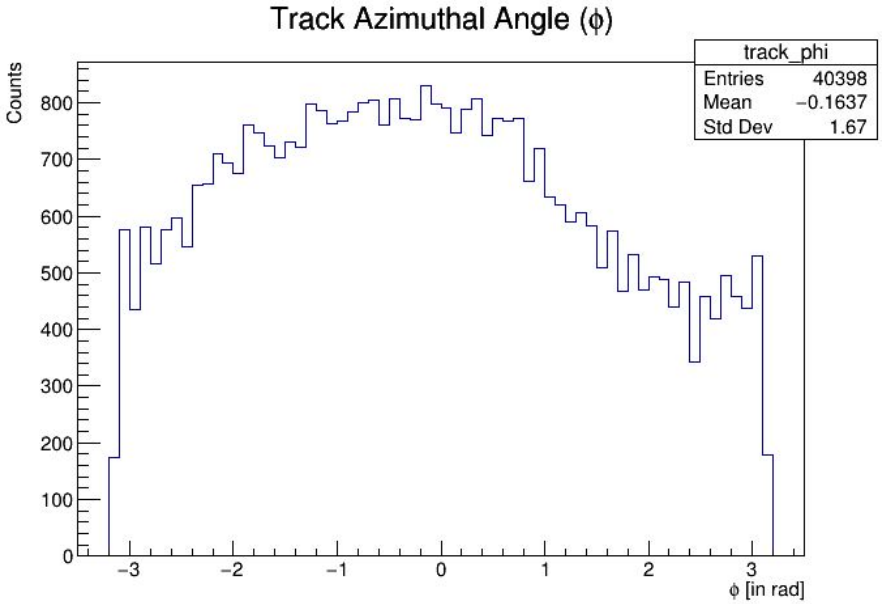


changed



Comparison: Track phi vs r

default



changed