

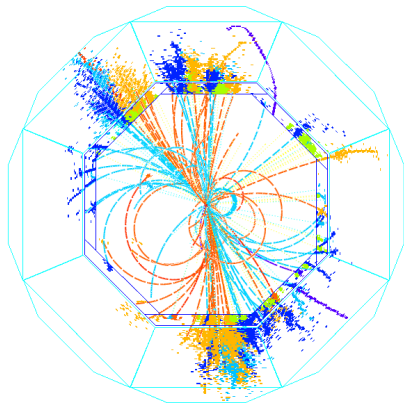
CLIC Software Activities

A. Münnich



22.5.2012, Software Meeting, Kyushu

- Coverity on ILCSOft (M. Killenberg)
- LCFI Vertex Check (J. Strube)
- AIDA: New Geometry Framework (P. Mato, M. Frank, A. Münnich)
- ILC Dirac (S. Poss)
- PandoraPFA for Digital HCAL (J. Strube)
- TPC track fitting with modules (B. Li)



Coverity on ILCSoft: Static Code Checker

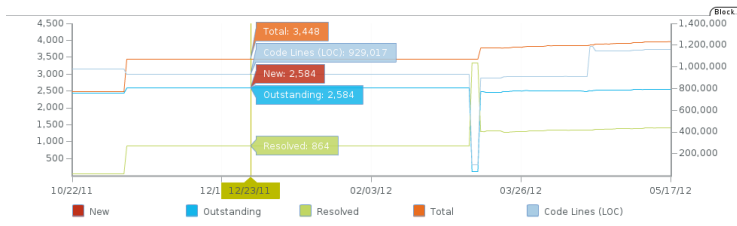
42150: Resource leak
...processEvent(...)
RESOURCE_LEAK
New / Unassigned / Other

42149: Resource leak
...end()
RESOURCE_LEAK
New / Unassigned / Other

42121: Parse warning
/MarInTPC/HEAD/rec...tFinderProcessor.cc
PWUSELESS_TYPE_QUALIFIER_ON_RETURN_TYF
New / Unassigned / Other

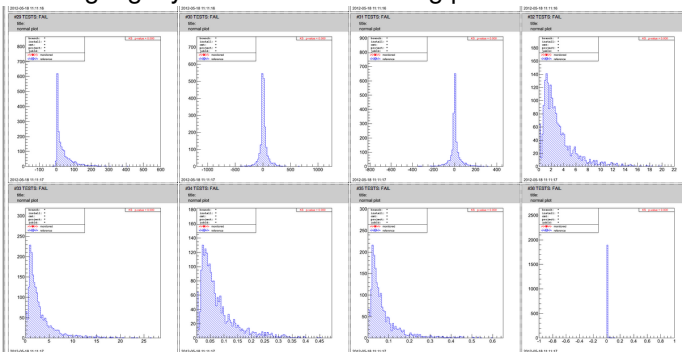
42120: Parse warning
/MarInTPC/HEAD/rec...tFinderProcessor.cc

```
302
303 void IonsInVoxelsProcessor::end()
304 {
305     if (!_rootFile)
306
307     ▶ CID 42149: Resource leak (RESOURCE_LEAK)
308     Calling allocation function "marIntpc::VoxelTPC::fetchVoxelCollection(double)". [show details]
309     ▶ Variable "this->_voxelTPC->fetchVoxelCollection(1)" is not freed or pointed-to in function
310     "marIntpc::IonsInVoxelsProcessor::fillTree(IMPL::LCCollectionVec *)". [show details]
311     Failing to save storage allocated by "this->_voxelTPC->fetchVoxelCollection(1)" leaks it.
312
313     ▲ 387     fillTree( _voxelTPC->fetchVoxelCollection() );
314     388
315     389     _rootFile->Write();
316     390     _rootFile->Close();
317     391     delete _rootFile;
318     392     _rootFile=0;
319     393     _chargeInVoxelsTree=0;
320     394 }
321     395 }
```



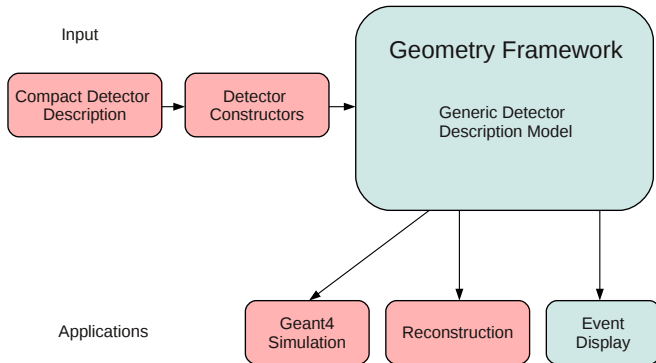
Results on <https://coverity.cern.ch/> (needs cern account)

Running nightly builds and monitoring plots



- Uses DCube, which is being used to monitor ATLAS Inner Detector Tracking Performance
- Runs on CLIC_ILD, CLIC_SiD, and ILD@91 GeV samples
- Results on this website:
<http://jstrube.web.cern.ch/jstrube/LCFIPlusNightlyBuild/lcfitest.html>

- Design of a new framework for detector description and geometry
- More functionality, more transparent, easier to use and maintain



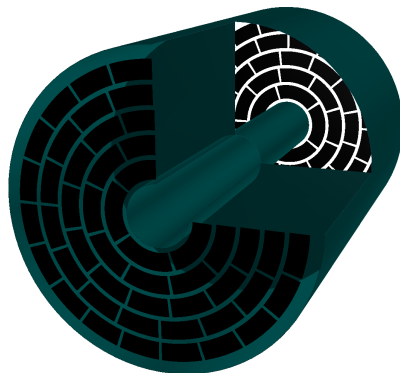
Tasks: implement a use case, exercise framework, find bugs and problems

More info: [Pere's talk at AIDA annual meeting](#)

- Simple geometry
- But: complex reconstruction needs from prototype studies

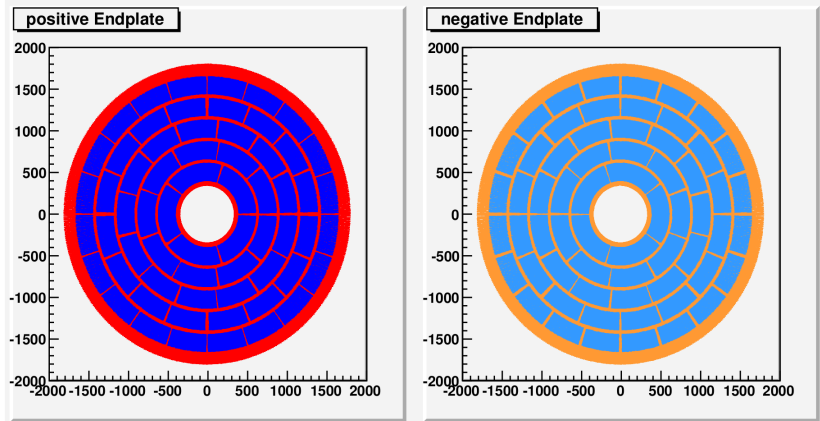
Toy Test Chain

- Create single straight tracks
- Digitization: mapping onto pads
- Hit reco: 3D hits from pads
- Track fit

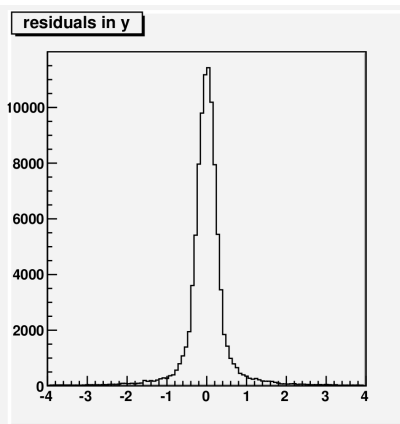
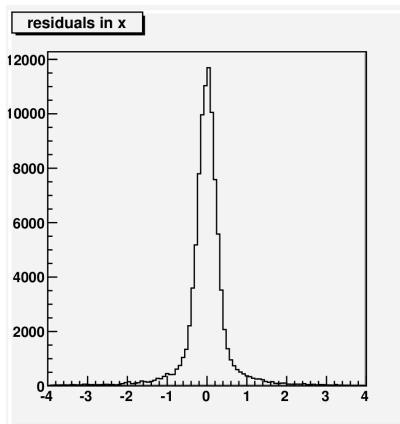


Endplate as example:

```
...
<detector name="TPC_EndPlate" type="TubeSegment" reflect="true" vis="TPCEndPlateVis" id="0">
  <material name="Carbon" />
  <tubs rmin="TPC_inner_radius" rmax="TPC_outer_radius" zhalf="0.5*TPC_endcap_thickness">
    <position x="0" y="0" z="TPC_zhalf-0.5*TPC_endcap_thickness">
      <rotation x="0" y="0" z="0">
        <modules name="TPC_Module" vis="TPCModuleVis">
          <row type="TubeSegment" mHeight="210" rowPitch="100" mPitch="35" pads="PadLayout0" nMods="5">
            <row type="TubeSegment" mHeight="210" rowPitch="100" mPitch="35" pads="PadLayout1" nMods="9">
              <row type="TubeSegment" mHeight="210" rowPitch="100" mPitch="35" pads="PadLayout2" nMods="13">
                <row type="TubeSegment" mHeight="210" rowPitch="100" mPitch="35" pads="PadLayout3" nMods="16">
                  <row type="TubeSegment" mHeight="210" rowPitch="100" mPitch="35" pads="PadLayout4" nMods="20">
                    <modules>
  </detector>
...
...
<readouts>
  <readout name="PadLayout0">
    <segmentation type="ProjectiveCylinder" phiBins="617" thetaBins="21"/>
    <id>system:6</id>
  </readout>
...
  <readout name="PadLayout4">
    <segmentation type="ProjectiveCylinder" phiBins="717" thetaBins="21"/>
    <id>system:8</id>
  </readout>
</readouts>
```

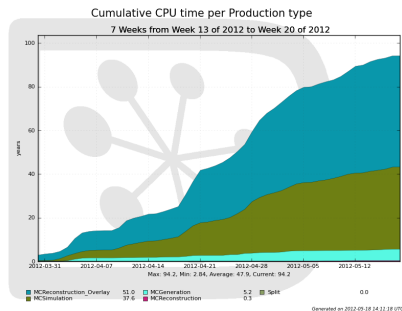
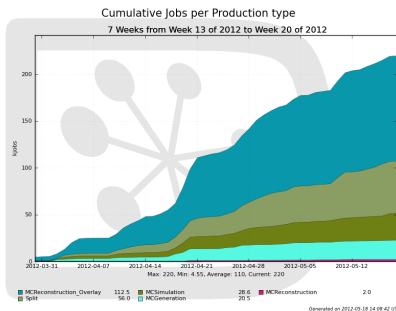


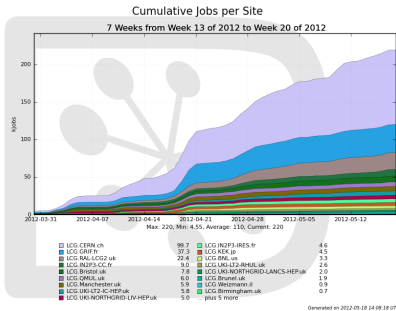
Both endplates work, modules easily changed via compact xml.



Expected performance for 2mm x 10mm pads with coarsely spaced modules.

Increasingly good and stable performance!
 Very good performance for CLIC CDR Volume 3 production!





Site	Physical Size [byte]
KEK-SRM	27,825,898,820
IN2P3-USER	39,616,111,352
IMPERIAL-SRM	1,902,158,794,808
RAL-SRM	4,330,404,387,544
SLAC-SRM	435,003,480
FNAL-SRM	89,380,244,156
CERN-SRM	317,013,951,504,842
IN2P3-SRM	4,348,758,736,455
BRISTOL-SRM	1,274,814,272
RALPP-SRM	20,737,796,556
Total	327,774,543,292,285 \approx 300 TB

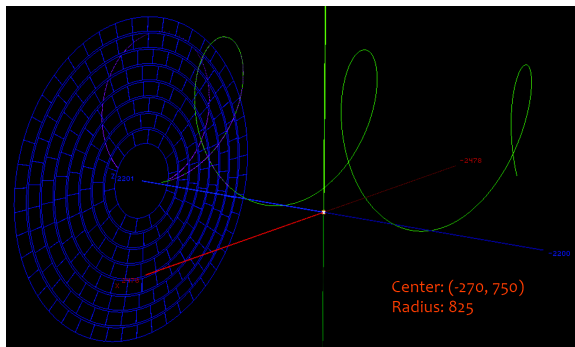
NEXT:

- SiD DBD production: provide the framework and the tools
- Additional CLIC productions
- Include WHIZARD 2 support

- RPC DHCAL is baseline in SiD, PandoraPFA for the DBD *tth* study
- Hit multiplicity is challenge for PFA: On average, a mip track produces more than one hit per layer. Effect on PFA performance needs to be investigated.
- Software calibration: Using EM calibration for EM parts of hadronic showers. Performance in DHCAL needs to be studied.

Work has recently started and is ongoing.

Extend Kalman-Filter to work on modular TPC Endplate:



NEXT:

- Include magnetic field map (inhomogeneous field)
- Include electric field map for drift
- Alignment (Large Prototype first)