

- ❑ Impact of MPPGD material on angular resolutions at PID surfaces
- ❑ Impact of MPPGD spatial resolution on angular resolutions at PID surfaces
- ❑ MPPGD detector occupancy studies
 - Hits per strip will need readout strip implementation via DD4hep Segmentations:
<https://github.com/AIDAsoft/DD4hep/tree/master/DDCore/src/segmentations>

❑ CyMBaL Tracker

- Built using tube geometry → first curved ACTS tracking surface in ePIC
- Curved surface issue in EICRecon (Issue #1330/1357):
 - *[acts_init] [error] Warning: Attempting cast a Acts::CylinderSurface to Acts::PlaneSurface returns nullptr. This surface will not be added to the .obj output.*
- Issue has now been resolved (Wouter)
 - <https://github.com/eic/EICrecon/issues/1330>
 - <https://github.com/eic/EICrecon/pull/1357>

- ❑ CyMBaL hits are reconstructed and are now being included in ACTS track fitting!

```
surfaceMap size: 1875
det ID : 61
hit position : 528.18 -78.46 -733.52
local position : 508.18 -78.46 158.48
surface center : 20.00 0.00 -892.00
acts local center: -78.78 158.48
acts loc pos : -78.78 158.48
System id: 64, Cell id: 33074357752307776
cov matrix: 2.25e-02 0.00e+00
            0.00e+00 2.25e-02
```

```
All hits processed. Hits size: 8 measurements->size: 8
```

- ❑ Subset of event hits can not be mapped to local ACTS surface
 - Increasing tolerance allows these events to be included in track

```
surfaceMap size: 1875
```

```
Can't convert globalToLocal for hit: vol_id=16838973 det_id=61 CellID=15520939032304480573 x=433.51102 y=-305.64764 z=139.62505
```

```
System id: 61, Cell id: 15331805427256062269
```

```
cov matrix:      2.25e-02    0.00e+00
                0.00e+00    2.25e-02
```

```
surfaceMap size: 1875
```

```
det ID : 61
```

```
hit position   :    433.14   -303.81    128.71
```

```
local position :    506.11    91.45   -179.79
```

```
surface center :    10.61   -10.61    308.50
```

```
acts local center:    91.93   -179.79
```

```
acts loc pos   :    91.93   -179.79
```

```
System id: 64, Cell id: 95420824575635520
```

```
cov matrix:      2.25e-02    0.00e+00
                0.00e+00    2.25e-02
```

```
All hits processed. Hits size: 9 measurements->size: 8
```

- ❑ Subset of event hist can not be mapped to local ACTS surface
 - Increasing tolerance allows these events to be included in track
 - But, tolerance value is large (~2mm) → could be related to a geometry

```
const auto& hit_pos = hit.getPosition(); // 3d position

Acts::Vector2 loc = Acts::Vector2::Zero();
Acts::Vector2 pos;
auto hit_det = hit.getCellID()&0xFF;
auto onSurfaceTolerance = 1.5*Acts::UnitConstants::mm; // Test -- delete MP
//auto onSurfaceTolerance = 0.1*Acts::UnitConstants::um; // By default, ACTS uses 0.1 micron as
if (hit_det==m_detid_b0tracker){ // FIXME Ugly hack for testing B0. Should
    onSurfaceTolerance = 1*Acts::UnitConstants::um;
}

try {
    // transform global position into local coordinates
    // geometry context contains nothing here
    pos = surface->globalToLocal(
        Acts::GeometryContext(),
        {hit_pos.x, hit_pos.y, hit_pos.z},
        {0, 0, 0}, onSurfaceTolerance).value();

    loc[Acts::eBoundLoc0] = pos[0];
    loc[Acts::eBoundLoc1] = pos[1];
}
catch(std::exception &ex) {
    m_log->warn("Can't convert globalToLocal for hit: vol_id={} det_id={} CellID={} x={} y={} z={}",
        vol_id, hit.getCellID()&0xFF, hit.getCellID(), hit_pos.x, hit_pos.y, hit_pos.z);
    continue;
}
```

<src/algorithms/tracking/TrackerMeasurementFromHits.cc>

- Investigate geometry
 - Look at hits from ddsim
 - Look at reconstructed hits (passed and failed conversions)
- Coordinate with Yann on geometry