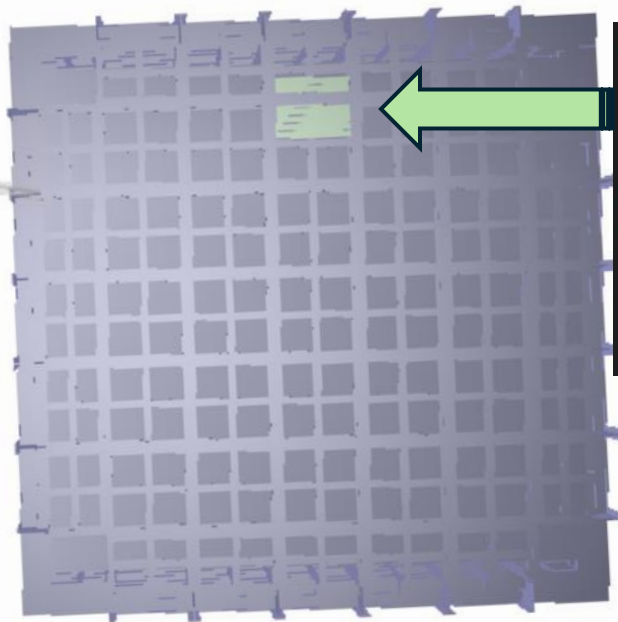


# Some changes/issues in geometry

Wenqiang Gu

# Restore small CRT panels in the GDML

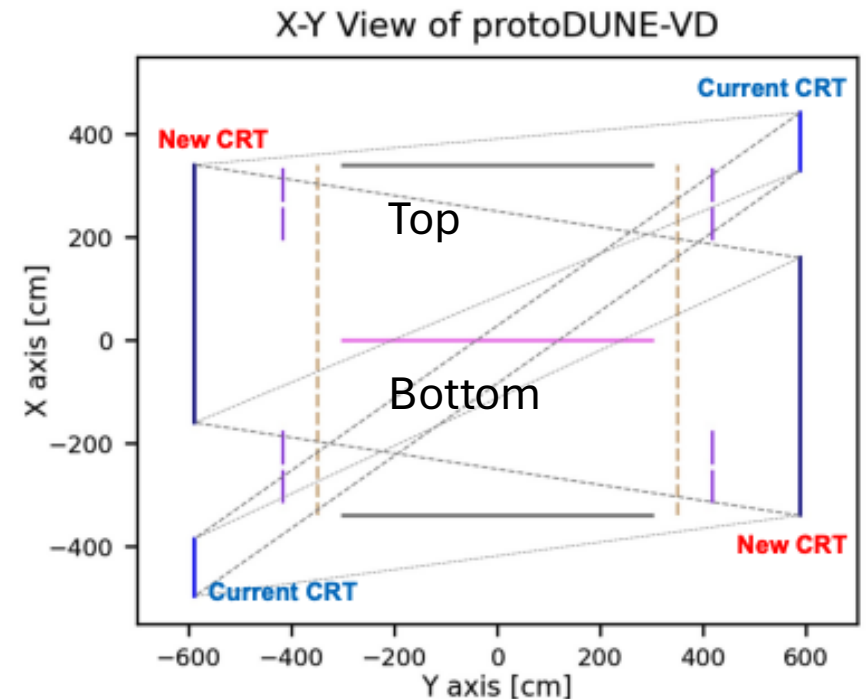
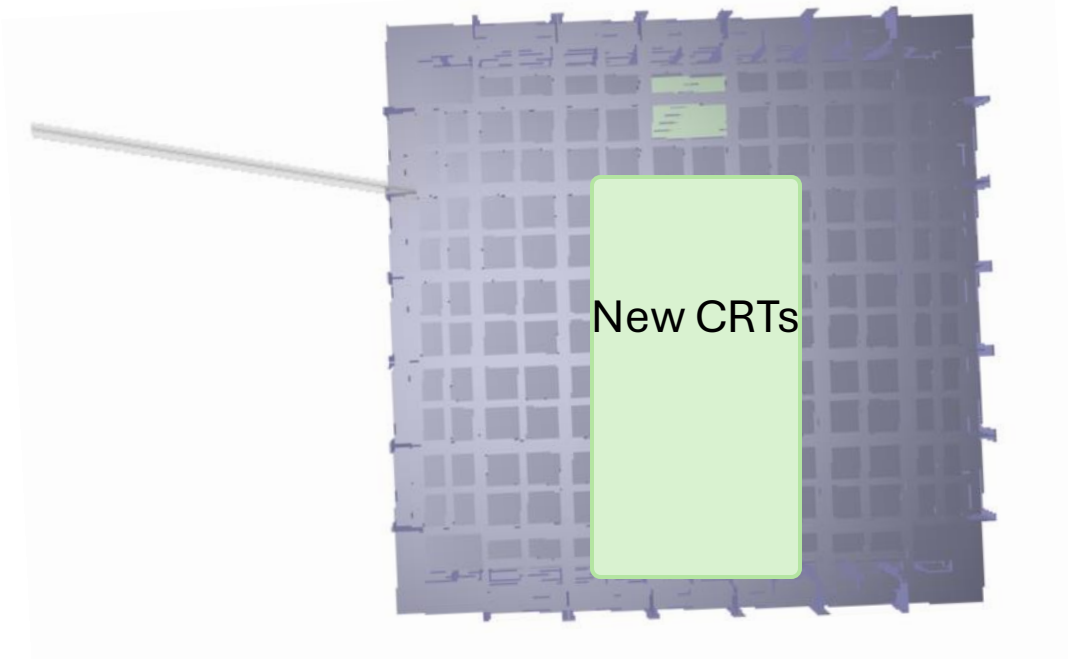


```
<physvol>
  <volumeref ref="volAuxDetCRTDPMModuleTop"/>
  <position name="posCRTDPTOPSensitive_1" unit="mm" x="3848" y="5882" z="0"/>
  <rotationref ref="rIdentity"/>
</physvol>
<physvol>
  <volumeref ref="volAuxDetCRTDPMModuleBottom"/>
  <position name="posCRTDPBOTTOMSensitive_1" unit="mm" x="-4406" y="-5882" z="0"/>
  <rotationref ref="rIdentity"/>
</physvol>
```

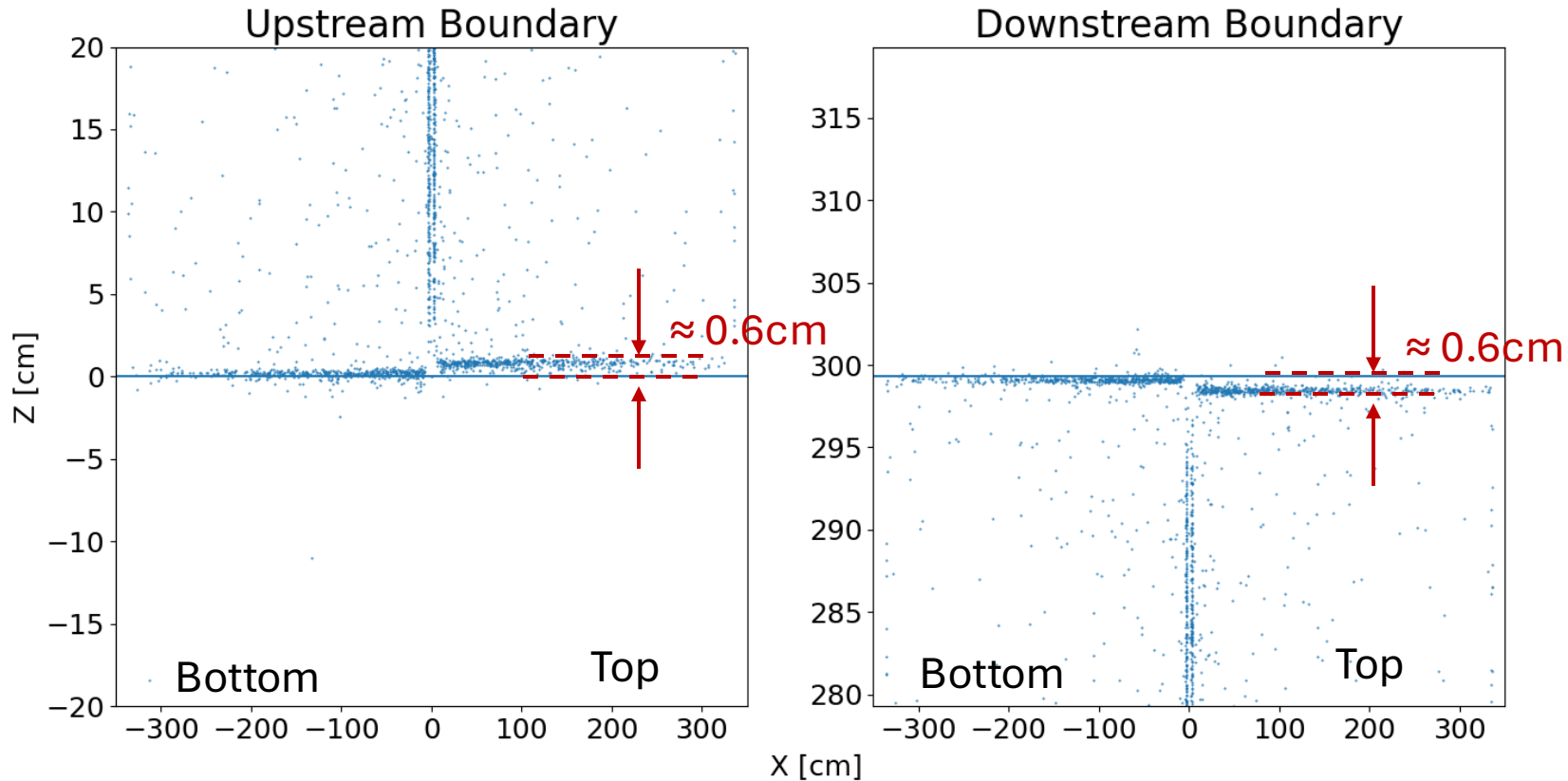
- The small CRT panels are removed given from v3 GDML given “an overlap with beam pipe”, but it appears no such overlap now

# Two additional big CRTs

- Proposal for new CRT locations in ProtoDUNE VD: [Shuaixiang's Rayleigh Scattering study](#)
- Some calculations for muon tagging efficiency with CRTs:  
[https://github.com/szhang17phys/newCRT\\_check.git](https://github.com/szhang17phys/newCRT_check.git)



# Asymmetric boundaries at top and bottom



Matt Siden

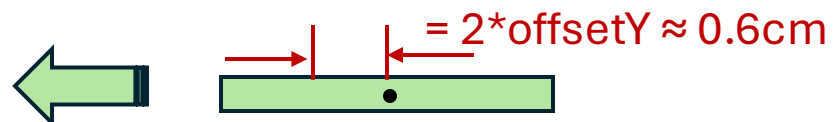
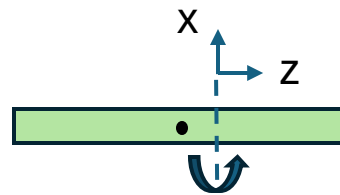
- Simulated energy depositions are not symmetric at top and bottom
- Indicates an offset in the TPC geometry implementation

# The origin of the offset

```
<volume name="volTPC0">
  <materialref ref="LAr"/>
  <solidref ref="CRM"/>
  <physvol>
    <volumeref ref="volTPCPlaneU0"/>
    <position name="posPlaneU0" unit="cm"
      x="169.23" y="0.3" z="0.275"/>
    <rotationref ref="rIdentity"/>
  </physvol>
```

- Given the borderCRP (=0.6cm), offsetY and offsetZ are calculated for each volTPC
- However, when volTPC is rotated for a bottom one, the offset would be translated to an asymmetry

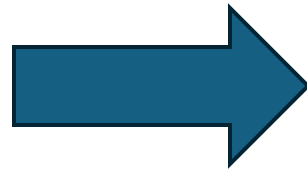
```
<physvol>
  <volumeref ref="volTPC0"/>
  <position name="posTopTPC-0" unit="cm"
    x="152.28" y="-252.75" z="-74.825"/>
</physvol>
<physvol>
  <volumeref ref="volTPC0"/>
  <position name="posBotTPC-0" unit="cm"
    x="-192.28" y="-252.75" z="-74.825"/>
  <rotationref ref="rPlus180AboutY"/>
</physvol>
```



# Solution: add the offset to <physvol>

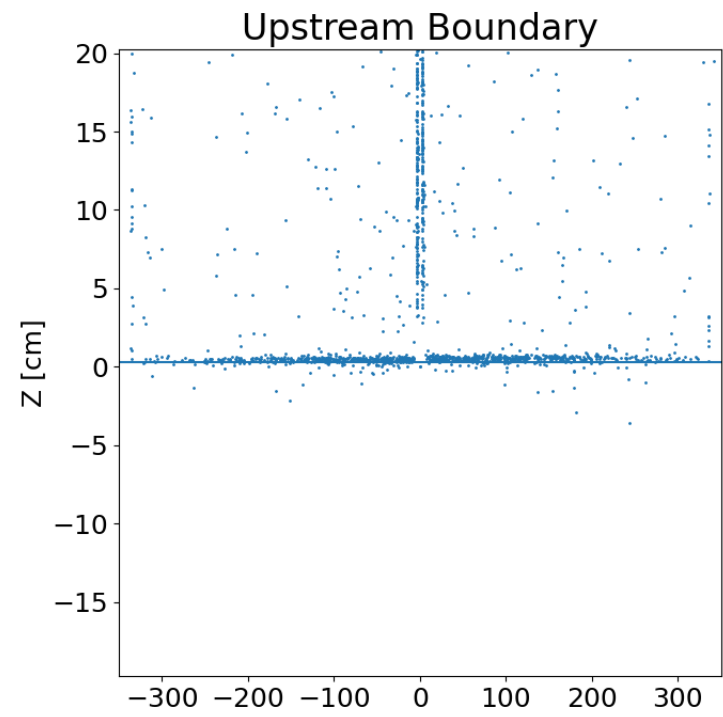
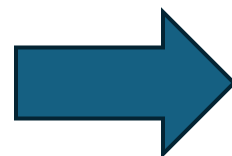
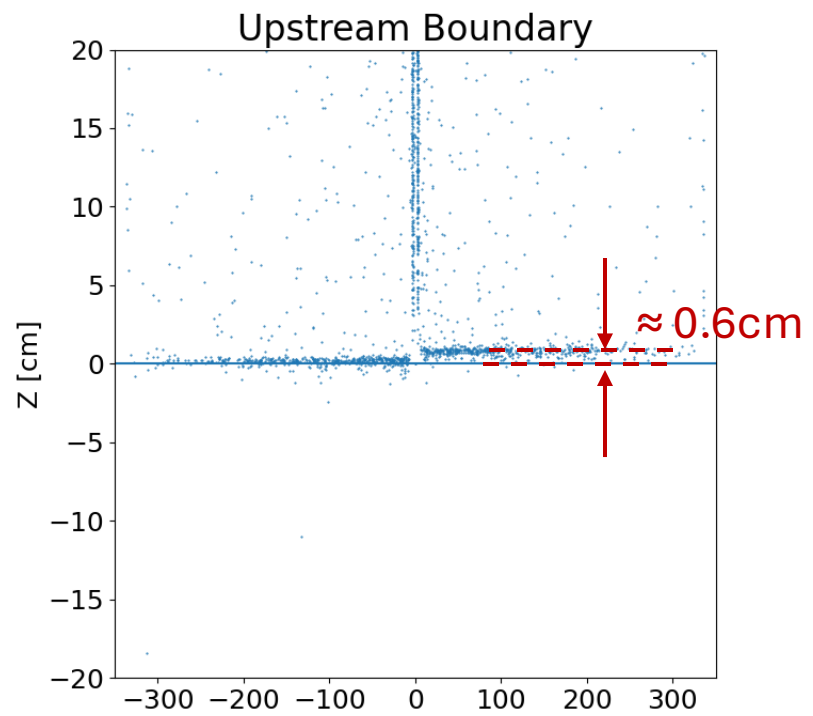
```
<volume name="volTPC0">
  <materialref ref="LAr"/>
  <solidref ref="CRM"/>
  <physvol>
    <volumeref ref="volTPCPlaneU0"/>
    <position name="posPlaneU0" unit="cm"
      x="169.23" y="0.3" z="0.275"/>
    <rotationref ref="rIdentity"/>
  </physvol>
```

```
<physvol>
  <volumeref ref="volTPC0"/>
  <position name="posTopTPC-0" unit="cm"
    x="152.28" y="-252.75" z="-74.825"/>
</physvol>
<physvol>
  <volumeref ref="volTPC0"/>
  <position name="posBotTPC-0" unit="cm"
    x="-192.28" y="-252.75" z="-74.825"/>
  <rotationref ref="rPlus180AboutY"/>
</physvol>
```



```
<volume name="volTPC0">
  <materialref ref="LAr"/>
  <solidref ref="CRM"/>
  <physvol>
    <volumeref ref="volTPCPlaneU0"/>
    <position name="posPlaneU0" unit="cm"
      x="169.23" y="0" z="0"/>
    <rotationref ref="rIdentity"/>
  </physvol>
```

```
<physvol>
  <volumeref ref="volTPC0"/>
  <position name="posTopTPC-0" unit="cm"
    x="152.28" y="-252.45" z="-74.55"/>
</physvol>
<physvol>
  <volumeref ref="volTPC0"/>
  <position name="posBotTPC-0" unit="cm"
    x="-192.28" y="-252.45" z="-74.55"/>
  <rotationref ref="rPlus180AboutY"/>
</physvol>
```





# Rotation in beam pipe

- It seems to have a rotation issue for the beam pipe
- An example G4 energy depo from beam particle generator:
  - $(x,y,z) = (127.1, -405.6, 576.8)$  cm
- Need a re-validation with beam particle simulation

