

“Blackhole” Nozzle in ddsim

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Killing tracks in regions

- DD4hep has the functionality to define LimitSets on certain regions
 - Use `track_length_max` limit to kill tracks
- See [this commit](#)

```
<limitset name="NozzleRegionLimitSet">  
  <limit name="track_length_max" particles="*" value="0.1" unit="mm"/>  
</limitset>
```

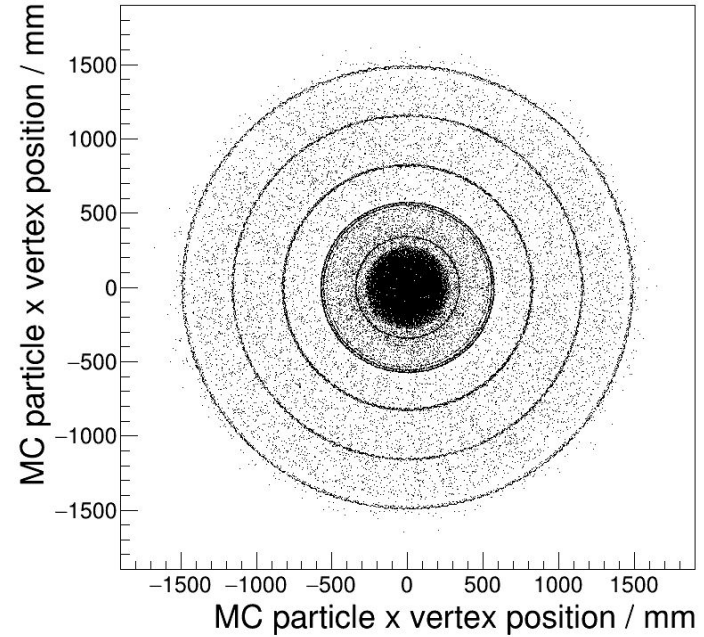
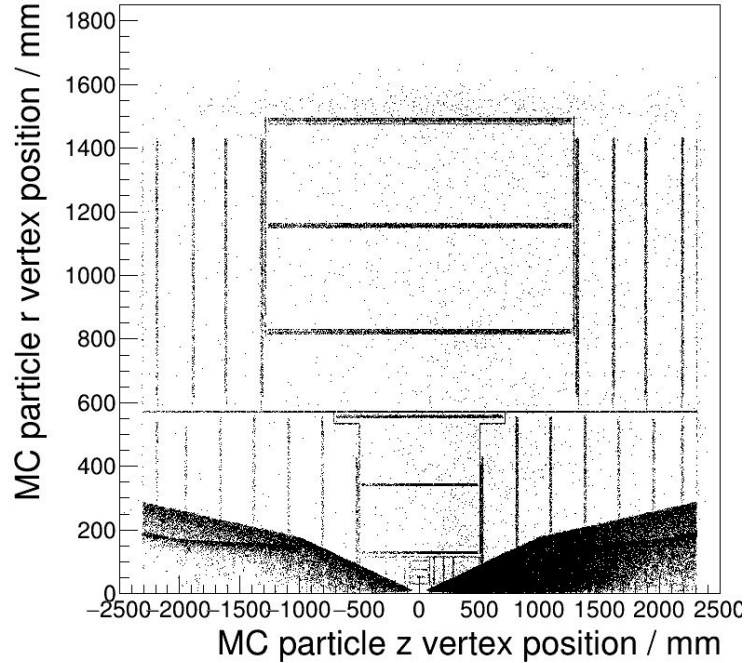
```
<detector name="NozzleW_right" type="DD4hep_PolyconeSupport" vis="NozzleWVis" region="NozzleRegion" limits="NozzleRegionLimitSet">  
  <comment>Internal part of the nozzle: Tungsten</comment>
```

```
<region name="NozzleRegion">  
  <limitsetref name="NozzleRegionLimitSet"/>  
</region>
```

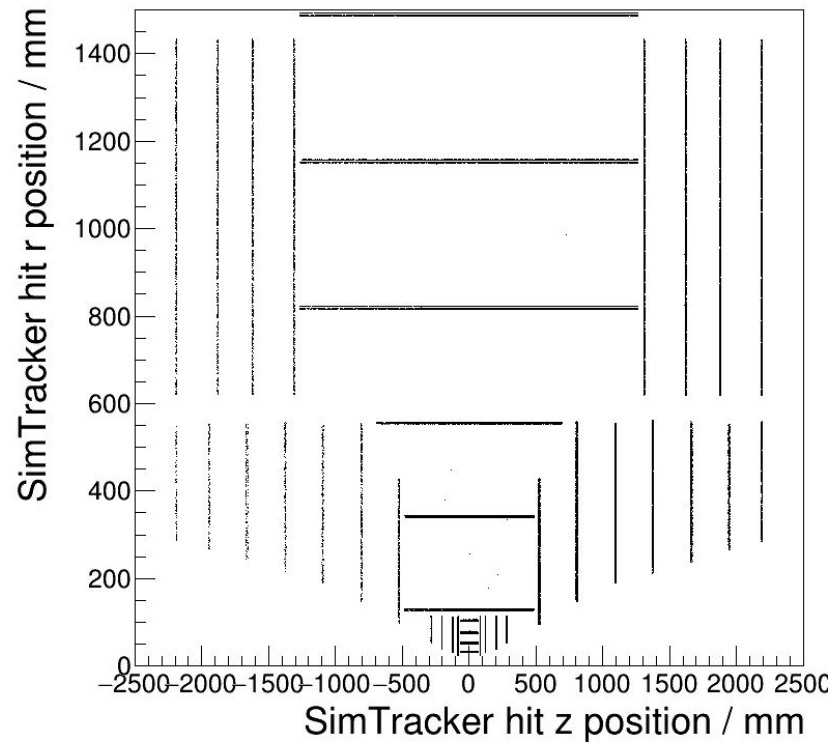
Setup for testing

- Modified pion gun to shoot directly at noozle
 - $0 < \theta / \text{degrees} < 9$
 - $10 < p_T / \text{GeV} < 50$
- Without limit set takes 140 s / event (on my laptop) for 10 pions / event
- With limit set virtually 0 s / event (since the only part of the detector we hit immediately kills tracks)

Position of MC particle vertices



SimTracker hit positions



“Conclusions”

- Putting a LimitSet into the detector geometry XML allows to kill tracks in regions
- Some studies probably necessary to check whether reflection / backscatter (or lack thereof) is an issue