



# TOF Upgrade Geometry Update

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TOF Meeting, July 3<sup>rd</sup>, 2019

Hdds github branch: `tof_upgrade`

Pre-Upgrade

⋮		
28		
27		
26		
25		
24		
46		23
45		22
21		
20		
19		
18		
17		
⋮		

Volume locations

(0.0, 70.175)

(0.0, 9.18)

(-/+ 66.0, 0.0)

(0.0, -9.18)

(0.0, -70.175)

Volume = top 1

Volume = top 2

Volume = top 3

Volume = south/north

Volume = bottom 3

Volume = bottom 2

Volume = bottom 1

Volume locations

(0.0, 76.305)

(0.0, 19.95)

(0.0, 12.27)

(-/+ 66.0, 0.0)

(0.0, -12.27)

(0.0, -19.95)

(0.0, -76.305)

Distance from center of  
TOF to center of  
volume

Post-Upgrade

⋮		
30		
29		
28		
27		
26		
50		25
49		24
48		23
47		22
21		
20		
19		
18		
17		
⋮		

Relative Locations

Pre-Upgrade

⋮		
28		
27		
26		
25		
24		
46		23
45		22
21		
20		
19		
18		
17		
⋮		

Volume Dimensions

(252.0, 115.8)

(252.0, 6.18)

(120.0, 12.18)

(252.0, 6.18)

(252.0, 115.8)

Envelope = FTOT

Envelope = FTOY

Envelope = FTOK

Envelope = FTOS/FTON

Envelope = FTOJ

Envelope = FTOZ

Envelope = FTOB

Volume Dimensions

(252.0, 103.53)

(252.0, 9.18)

(252.0, 6.18)

(120.0, 18.36)

(252.0, 6.18)

(252.0, 9.18)

(252.0, 103.53)

length,  
#pad \* (width+0.09)

Post-Upgrade

⋮		
30		
29		
28		
27		
26		
50		25
49		24
48		23
47		22
21		
20		
19		
18		
17		
⋮		

Air Volumes

Pre-Upgrade

⋮		
28		
27		
26		
25		
24		
46		23
45		22
21		
20		
19		
18		
17		
⋮		

Volume Parameters

ncopy = 19  
Y0 = -54.855  
dY = 6.09  
row = 26

ncopy = 2  
Y0 = -1.545  
dY = 3.09  
row = 24

ncopy = 2  
Y0 = -3.045  
dY = 6.09  
row = 45/22  
column = 2/1

ncopy = 2  
Y0 = -1.545  
dY = 3.09  
row = 20

ncopy = 19  
Y0 = -54.855  
dY = 6.09  
row = 1

Volume = FTOC

# of paddles  
 $0.5 * \text{VolY} + 0.5 * (\text{wid} + 0.09)$   
width + 0.09  
Paddle #

Volume = FTOX

Volume = FTOL

Volume = FTOH

Volume = FTOL

Volume = FTOX

Volume = FTOC

Volume Parameters

ncopy = 17  
Y0 = -48.72  
dY = 6.09  
row = 30

ncopy = 2  
Y0 = -2.295  
dY = 4.59  
row = 28

ncopy = 2  
Y0 = -1.545  
dY = 3.09  
row = 26

ncopy = 4  
Y0 = -6.885  
dY = 4.59  
row = 47/22  
column = 2/1

ncopy = 2  
Y0 = -1.545  
dY = 3.09  
row = 20

ncopy = 2  
Y0 = -2.295  
dY = 4.59  
row = 18

ncopy = 17  
Y0 = -48.72  
dY = 6.09  
row = 1

Post-Upgrade

⋮		
30		
29		
28		
27		
26		
50		25
49		24
48		23
47		22
21		
20		
19		
18		
17		
⋮		

Scintillator Volumes

Pre-Upgrade

⋮		
28		
27		
26		
25		
24		
46		23
45		22
21		
20		
19		
18		
17		
⋮		

Volume Dimensions

(252.0, 6.0)

(252.0, 3.0)

(120.0, 6.0)

(252.0, 3.0)

(252.0, 6.0)

Volume = FTOC

Volume = FTOX

Volume = FTOL

Volume = FTOH

Volume = FTOL

Volume = FTOX

Volume = FTOC

Volume Dimensions

(252.0, 6.0)

(length, width)

(252.0, 4.5)

(252.0, 3.0)

(120.0, 4.5)

(252.0, 3.0)

(252.0, 4.5)

(252.0, 6.0)

⋮

30		
29		
28		
27		
26		
50		25
49		24
48		23
47		22
21		
20		
19		
18		
17		
⋮		

Post-Upgrade

Scintillator Volumes

# Pre-Upgrade (No Shield)

```
<composition name="ForwardTOF">
  <posXYZ volume="forwardTOF" X_Y_Z="0.0 0.0 3.85" rot="0 0 -90">
    <plane value="0" />
  </posXYZ>
  <posXYZ volume="forwardTOF" X_Y_Z="0.0 0.0 1.27" rot="0 0 0">
    <plane value="1" />
  </posXYZ>
</composition>

<composition name="forwardTOF" envelope="FTOF">
  <posXYZ volume="forwardTOF_bottom1" X_Y_Z="0.0 -70.175 0.0" />
  <posXYZ volume="forwardTOF_bottom2" X_Y_Z="0.0 -9.18 0.0" />
  <posXYZ volume="forwardTOF_north" X_Y_Z="+66.0 0.0 0.0" />
  <posXYZ volume="forwardTOF_south" X_Y_Z="-66.0 0.0 0.0" />
  <posXYZ volume="forwardTOF_top2" X_Y_Z="0.0 +9.18 0.0" />
  <posXYZ volume="forwardTOF_top1" X_Y_Z="0.0 +70.175 0.0" />
</composition>

<!-- the attribute 'row' is synonymous with 'bar' -->
<composition name="forwardTOF_top1" envelope="FTOT">
  <mposY volume="FTOC" ncopy="19" Z_X="0.0 0.0" Y0="-54.855" dY="6.09">
    <row value="26" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_top2" envelope="FTOY">
  <mposY volume="FTOX" ncopy="2" Z_X="0.0 0.0" Y0="-1.545" dY="3.09">
    <row value="24" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_bottom1" envelope="FTOB">
  <mposY volume="FTOC" ncopy="19" Z_X="0.0 0.0" Y0="-54.855" dY="6.09">
    <row value="1" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_bottom2" envelope="FTOZ">
  <mposY volume="FTOX" ncopy="2" Z_X="0.0 0.0" Y0="-1.545" dY="3.09">
    <row value="20" step="1" />
    <column value="0" />
```

```
</mposY>
</composition>
<composition name="forwardTOF_north" envelope="FTON">
  <mposY volume="FTOH" ncopy="2" Z_X="0.0 0.0" Y0="-3.045" dY="6.09">
    <row value="22" step="1" />
    <column value="1" />
  </mposY>
</composition>
<composition name="forwardTOF_south" envelope="FTOS">
  <mposY volume="FTOH" ncopy="2" Z_X="0.0 0.0" Y0="-3.045" dY="6.09">
    <row value="45" step="1" />
    <column value="2" />
  </mposY>
</composition>

<box name="FTOF" X_Y_Z="252.0 268.8 2.55" material="Air" />
<box name="FTOB" X_Y_Z="252.0 115.8 2.55" material="Air" />
<box name="FTOT" X_Y_Z="252.0 115.8 2.55" material="Air" />
<box name="FTOY" X_Y_Z="252.0 6.18 2.55" material="Air" />
<box name="FTOZ" X_Y_Z="252.0 6.18 2.55" material="Air" />
<box name="FTON" X_Y_Z="120.0 12.18 2.55" material="Air" />
<box name="FTOS" X_Y_Z="120.0 12.18 2.55" material="Air" />
<box name="FTOC" X_Y_Z="252.0 6.0 2.54" material="Scintillator"
      sensitive="true" />
<box name="FTOH" X_Y_Z="120.0 6.0 2.54" material="Scintillator"
      sensitive="true" />
<box name="FTOX" X_Y_Z="252.0 3.0 2.54" material="Scintillator"
      sensitive="true" />
```

# Post-Upgrade

```
<composition name="ForwardTOF">
  <posXYZ volume="forwardTOF" X_Y_Z="0.0 0.0 3.85" rot="0 0 -90">
    <plane value="0" />
  </posXYZ>
  <posXYZ volume="forwardTOF" X_Y_Z="0.0 0.0 1.27" rot="0 0 0">
    <plane value="1" />
  </posXYZ>
</composition>

<composition name="forwardTOF" envelope="FTOF">
  <posXYZ volume="forwardTOF_bottom1" X_Y_Z="0.0 -76.305 0.0" />
  <posXYZ volume="forwardTOF_bottom2" X_Y_Z="0.0 -19.95 0.0" />
  <posXYZ volume="forwardTOF_bottom3" X_Y_Z="0.0 -12.27 0.0" />
  <posXYZ volume="forwardTOF_north" X_Y_Z="+66.0 0.0 0.0" />
  <posXYZ volume="forwardTOF_south" X_Y_Z="-66.0 0.0 0.0" />
  <posXYZ volume="forwardTOF_top3" X_Y_Z="0.0 +12.27 0.0" />
  <posXYZ volume="forwardTOF_top2" X_Y_Z="0.0 +19.95 0.0" />
  <posXYZ volume="forwardTOF_top1" X_Y_Z="0.0 +76.305 0.0" />
</composition>

<!-- the attribute 'row' is synonymous with 'bar' -->
<composition name="forwardTOF_top1" envelope="FTOT">
  <mposY volume="FTOC" ncopy="17" Z_X="0.0 0.0" Y0="-48.72" dY="6.09">
    <row value="30" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_top2" envelope="FTOY">
  <mposY volume="FTOX" ncopy="2" Z_X="0.0 0.0" Y0="-2.295" dY="4.59">
    <row value="28" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_top3" envelope="FTOK">
  <mposY volume="FTOL" ncopy="2" Z_X="0.0 0.0" Y0="-1.545" dY="3.09">
    <row value="26" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_bottom1" envelope="FTOB">
  <mposY volume="FTOC" ncopy="17" Z_X="0.0 0.0" Y0="-48.72" dY="6.09">
    <row value="1" step="1" />
    <column value="0" />
  </mposY>
```

```
</composition>
<composition name="forwardTOF_bottom2" envelope="FTOZ">
  <mposY volume="FTOX" ncopy="2" Z_X="0.0 0.0" Y0="-2.295" dY="4.59">
    <row value="18" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_bottom3" envelope="FTOJ">
  <mposY volume="FTOL" ncopy="2" Z_X="0.0 0.0" Y0="-1.545" dY="3.09">
    <row value="20" step="1" />
    <column value="0" />
  </mposY>
</composition>
<composition name="forwardTOF_north" envelope="FTON">
  <mposY volume="FTOH" ncopy="4" Z_X="0.0 0.0" Y0="-6.885" dY="4.59">
    <row value="22" step="1" />
    <column value="1" />
  </mposY>
</composition>
<composition name="forwardTOF_south" envelope="FTOS">
  <mposY volume="FTOH" ncopy="4" Z_X="0.0 0.0" Y0="-6.885" dY="4.59">
    <row value="47" step="1" />
    <column value="2" />
  </mposY>
</composition>

<box name="FTOF" X_Y_Z="252.0 268.8 2.55" material="Air" />
<box name="FTOB" X_Y_Z="252.0 103.53 2.55" material="Air" />
<box name="FTOT" X_Y_Z="252.0 103.53 2.55" material="Air" />
<box name="FTOJ" X_Y_Z="252.0 6.18 2.55" material="Air" />
<box name="FTOK" X_Y_Z="252.0 6.18 2.55" material="Air" />
<box name="FTOY" X_Y_Z="252.0 9.18 2.55" material="Air" />
<box name="FTOZ" X_Y_Z="252.0 9.18 2.55" material="Air" />
<box name="FTON" X_Y_Z="120.0 18.36 2.55" material="Air" />
<box name="FTOS" X_Y_Z="120.0 18.36 2.55" material="Air" />
<box name="FTOC" X_Y_Z="252.0 6.0 2.54" material="Scintillator"
      sensitive="true" />
<box name="FTOL" X_Y_Z="252.0 3.0 2.54" material="Scintillator"
      sensitive="true" />
<box name="FTOH" X_Y_Z="120.0 4.5 2.54" material="Scintillator"
      sensitive="true" />
<box name="FTOX" X_Y_Z="252.0 4.5 2.54" material="Scintillator"
      sensitive="true" />
```