

# REMOLL DETECTOR PARAMETERISATION

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# PURPOSE

- To easily change parameters such as detector dimensions, position of quartz ring, tilt angle of quartz w.r.t. xy-plane, tilt angle of light guide w.r.t quartz etc.

# METHOD

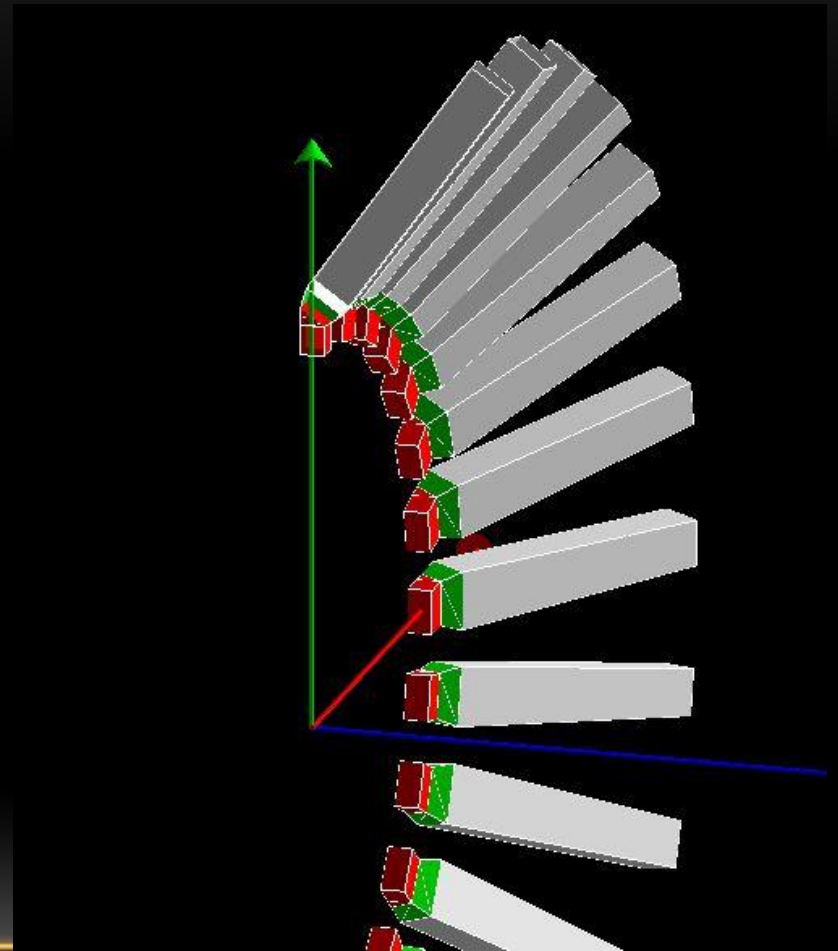
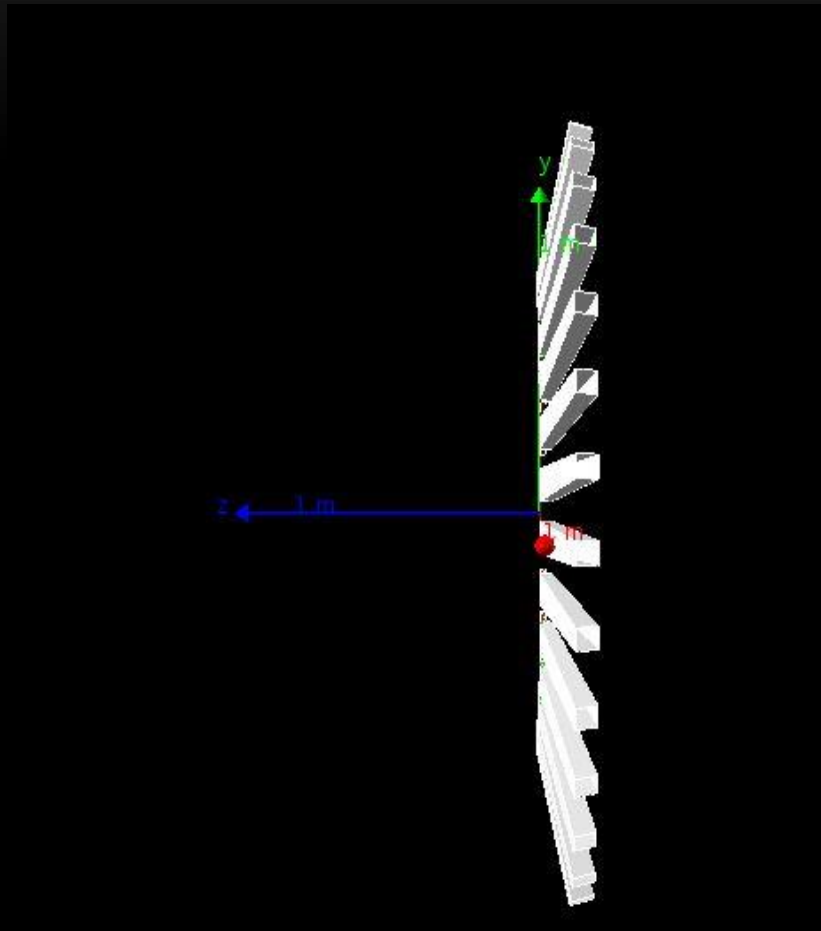
- Perl script called gdmlGenerator.pl.
- Copy the perl script into the geometry folder and type perl gdmlGenerator.pl to run it after setting the appropriate parameters.
- This will generate three files definitionsNew.xml, solidsNew.xml and detectorNew.gdml.
- Set the detectorNew.gdml file as the detector module in mollerMother.gdml.

```
$numRing = 7; # number of rings to draw
@quartzTiltAngle = (45, 0, 0, 0, 0, 0, 0); # angle of tilt of quartz with respect to xy-plane
@quartzThickness = (15, 15, 15, 15, 15, 15, 15); # thickness of quartz piece along z-axis
@quartzHeight = (50, 100, 60, 40, 120, 100, 120); # height of quartz piece
@quartzRad = (656, 731, 811, 860, 940, 1050, 940); # radial position of quartz ring
@numDetPerRing = (28, 28, 28, 28, 84, 28, 84); # number of detectors per ring
@quartzZ = (0, 400, 800, 1200, 1400, 1600, 1800); # position of the quartz ring along z-axis. Positive implies downstream.
@wtOverlap = (1.1,1.1,1.1,1.1,1.1,1.1,1.1); # weight factor to avoid overlap.
for $i(0..$numRing-1){
$quartzWidth[$i]= pi*(($quartzRad[$i]+$quartzHeight[$i]/2)*($quartzRad[$i]+$quartzHeight[$i]/2)-($quartzRad[$i]-$quartzHeight[$i]/2)*($quartzRad[$i]-$quartzHeight[$i]/2))/(($wtOverlap[$i]*$numDetPerRing[$i]*$quartzHeight[$i]); # calculate azimuthal width of quartz piece
}
@lgTiltAngle = (25, 25, 35, 15, 0, -15, -20); # light guide tilt angle with respect to quartz piece.
@lgLength = (485, 385, 325, 285, 165, 65, 165); # length of light guide
@refOpeningAngle = (19, 19, 19, 19, 19, 19, 19); # opening angle of reflector
@refLength = (35, 35, 35, 35, 35, 35, 35); # length of reflector
@pmtWindowSize= (76.2,76.2,76.2,76.2,76.2,76.2,76.2); # length of one side of square pmt window
@wallThick = (1,1,1,1,1,1,1); #thickness of wall of reflector and light guide
```

# METHOD

- Given the initial height and ring position, the code will calculate the azimuthal width of the individual quartz in a ring. These dimensions can again be changed within the definitionsNew.xml by changing the elements of the quartzDim matrices.
- Position of the center of the individual quartz piece can also be changed by changing the elements of the quartzPos and quartzRot matrices. Adding a positive offset to the azimuthal angle (column 2) of quartzPos needs to be complemented by an equal negative offset to the quartzRot z-component.

# SAMPLE OUTPUT



# LIMITATIONS

- The PMT window is square and not circular.
- Have not implemented quartz tilt angle yet.

# LIGHT GUIDE RESPONSE STUDIES

- Write a generator to use hits on detector plane to generate particles in a standalone program with just the detector geometry in one septant.

