

Text "ArtifactPhantom"

```
#define rhoWater    1.0
#define rhoObject   2.0
#define ConeAngle   5.0
```

Phantom

```
// Surrounding water (of nearly infinite length)
{ [ Cylinder_z: x=0 y=0 z=0mm r=100mm l=2000mm ] rho=rhoWater }

// The following objects are defined from negative z's to positive z's
// The object starts at z=-15mm and ends at z=200mm

// Solid cylinder (at -15mm<=z<=-11mm)
{ [ Cylinder_z: x=0 y=0 z=-13mm r=80mm l=4mm] rho=rhoObject }

// Solid cylinder (at -10mm<=z<=-6mm)
{ [ Cylinder_z: x=0 y=0 z=-8mm r=80mm l=4mm] rho=rhoObject }

// Hollow cylinder (at -5mm<=z<=-1mm)
{ [ Cylinder_z: x=0 y=0 z=-3mm r=80mm l=4mm] rho=rhoObject }
{ [ Cylinder_z: x=0 y=0 z=-3mm r=70mm l=4mm] rho=rhoWater }

// Hollow cylinder at bottom that is clipped by a plane (a) tilted by the
ConeAngle
{ [ Cylinder_z: x=0 y=0 z=250mm r=80mm l=500mm r(sin(ConeAngle), 0,
cos(ConeAngle)) < 20mm] rho=rhoObject }
{ [ Cylinder_z: x=0 y=0 z=250mm r=70mm l=500mm r(sin(ConeAngle), 0,
cos(ConeAngle)) < 20mm] rho=rhoWater }

// Solid cylinder following the hollow cylinder that is clipped by plane
(a) at the bottom
// and clipped at the top by another parallel plane (b) 20mm above
{ [ Cylinder_z: x=0 y=0 z=250mm r=10mm l=500mm r(sin(ConeAngle), 0,
cos(ConeAngle)) > 20mm r(sin(ConeAngle),0,cos(ConeAngle))<40mm]
rho=rhoObject }

// 5 cylinders centered on a equilateral pentagon (radius 50mm) that have
their bottom clipped by plane (b)
{ [ Cylinder_z: x=cos(0)*50mm y=sin(0)*50mm z=50mm r=10mm l=100mm
r(sin(ConeAngle),0,cos(ConeAngle))>40mm] rho=rhoObject }
{ [ Cylinder_z: x=cos(72)*50mm y=sin(72)*50mm z=45mm r=10mm l= 90mm
r(sin(ConeAngle),0,cos(ConeAngle))>40mm] rho=rhoObject }
{ [ Cylinder_z: x=cos(144)*50mm y=sin(144)*50mm z=40mm r=10mm l= 80mm
r(sin(ConeAngle),0,cos(ConeAngle))>40mm] rho=rhoObject }
{ [ Cylinder_z: x=cos(216)*50mm y=sin(216)*50mm z=35mm r=10mm l= 70mm
r(sin(ConeAngle),0,cos(ConeAngle))>40mm] rho=rhoObject }
{ [ Cylinder_z: x=cos(288)*50mm y=sin(288)*50mm z=30mm r=10mm l= 60mm
r(sin(ConeAngle),0,cos(ConeAngle))>40mm] rho=rhoObject }

// 5 cones sitting on top of the 5 cylinders above
{ [ Cone_z: x=cos(0)*50mm y=sin(0)*50mm z=150mm r2=0 r1=10mm
l=100mm ] rho=rhoObject }
{ [ Cone_z: x=cos(72)*50mm y=sin(72)*50mm z=145mm r2=0 r1=10mm
l=110mm ] rho=rhoObject }
{ [ Cone_z: x=cos(144)*50mm y=sin(144)*50mm z=140mm r2=0 r1=10mm
l=120mm ] rho=rhoObject }
{ [ Cone_z: x=cos(216)*50mm y=sin(216)*50mm z=135mm r2=0 r1=10mm
l=130mm ] rho=rhoObject }
{ [ Cone_z: x=cos(288)*50mm y=sin(288)*50mm z=130mm r2=0 r1=10mm
l=140mm ] rho=rhoObject }
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// 2 touching hollow spheres (thickness 1mm and 2mm) at the center of the
pentagon with r1=10mm at z1=90mm and r2=20mm z=120mm
{ [ Sphere: x=0mm y=0mm z=90mm r=10mm] rho=rhoObject }
{ [ Sphere: x=0mm y=0mm z=90mm r= 9mm] rho=rhoWater }
{ [ Sphere: x=0mm y=0mm z=120mm r=20mm] rho=rhoObject }
{ [ Sphere: x=0mm y=0mm z=120mm r=18mm] rho=rhoWater }

// Only define detectors when running cutsim.
#ifdef CUTSIM

#define NPIX 1024

// axial plane
Detector
{ [ Plane_xz : x=0 y=0 z=100mm ]
  x1=-120mm x2=120mm
  z1= -20mm z2=220mm
  nx=NPIX   nz=NPIX
}

// some transaxial planes
Detector
{ [ Plane_xy : x=0 y=0 z=20mm ]
  x1=-120mm x2=120mm
  y1=-120mm y2=120mm
  nx=NPIX   ny=NPIX
}
Detector
{ [ Plane_xy : x=0 y=0 z=40mm ]
  x1=-120mm x2=120mm
  y1=-120mm y2=120mm
  nx=NPIX   ny=NPIX
}
Detector
{ [ Plane_xy : x=0 y=0 z=75mm ]
  x1=-120mm x2=120mm
  y1=-120mm y2=120mm
  nx=NPIX   ny=NPIX
}
Detector
{ [ Plane_xy : x=0 y=0 z=120mm ]
  x1=-120mm x2=120mm
  y1=-120mm y2=120mm
  nx=NPIX   ny=NPIX
}
Detector
{ [ Plane_xy : x=0 y=0 z=150mm ]
  x1=-120mm x2=120mm
  y1=-120mm y2=120mm
  nx=NPIX   ny=NPIX
}

// 5 planes containing the pentagon's cylinders and cones
Detector
{ [ Plane: x=0 y=0 z=0  a_x(cos(0)*50mm, sin(0)*50mm, 0)  a_y(0,0,1) ]
  x1=-120mm x2=120mm
  y1= -20mm y2=220mm
  nx=NPIX   ny=NPIX
}

```

```

}
Detector
{ [ Plane: x=0 y=0 z=0 a_x(cos(72)*50mm, sin(72)*50mm, 0) a_y(0,0,1) ]
  x1=-120mm x2=120mm
  y1= -20mm y2=220mm
  nx=NPIX ny=NPIX
}
Detector
{ [ Plane: x=0 y=0 z=0 a_x(cos(144)*50mm, sin(144)*50mm, 0) a_y(0,0,1) ]
  x1=-120mm x2=120mm
  y1= -20mm y2=220mm
  nx=NPIX ny=NPIX
}
Detector
{ [ Plane: x=0 y=0 z=0 a_x(cos(216)*50mm, sin(216)*50mm, 0) a_y(0,0,1) ]
  x1=-120mm x2=120mm
  y1= -20mm y2=220mm
  nx=NPIX ny=NPIX
}
Detector
{ [ Plane: x=0 y=0 z=0 a_x(cos(288)*50mm, sin(288)*50mm, 0) a_y(0,0,1) ]
  x1=-120mm x2=120mm
  y1= -20mm y2=220mm
  nx=NPIX ny=NPIX
}

#endif

```