

```
In[6]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\WK03/"]
```

```
Out[6]= C:\\drorbn\\AcademicPensieve\\Projects\\WK03
```

```
In[6]:= size = 120;
s1[t_] := 1 + 0.5 (1 - t) (1 + t); s2[t_] := 1 - 0.25 (1 - t) (1 + t);
tilt[t_] := 0 * 0.5 (1 - t) (1 + t);
p1[t_] := {1.25 t, 0, -0.3 Sin[π t]}; p2[t_] := -p1[t];
Ring[p_, s_, tilt_] := Tube[
  Table[
    p + s {Cos[θ] Cos[tilt], Sin[θ], Cos[θ] Sin[tilt]},
    {θ, 0, 2 π, 2 π/72}
  ], 0.24 s
];
PinkBlueRings[t_] := Graphics3D[{
  Pink, Ring[p1[t], s1[t], tilt[t]],
  Blue, Ring[p2[t], s2[t], tilt[t]]
},
ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
];
```

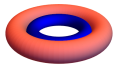
```
In[6]:= {{p1[t], s1[t], tilt[t]}, {p2[t], s2[t], tilt[t]}} /. t → -1
```

```
Out[6]= {{{-1.25, 0, 0.}, 1., 0.}, {{1.25, 0, 0.}, 1., 0.}}
```

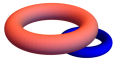
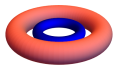
```

In[ ]:= size = 480;
TheVertex = (
  Rasterize[#, RasterSize → 480] & /@
  {
    purplering = Graphics3D[{
      Purple, Ring[{0, 0, 0}, 1, 0]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → 480
  ],
  purplering,
  Graphics3D[{
    Pink, Ring[{0, 0, 0}, 1.3, 0],
    Blue, Ring[{0, 0, 0}, 0.8, 0]
  },
  ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → 480
  ],
  PinkBlueRings[0],
  PinkBlueRings[-1/2],
  PinkBlueRings[-1]
  }
) // GraphicsColumn

```



Out[]:=



```

In[ ]:= Export["TheVertex.png", TheVertex]

```

Out[]:= TheVertex.png

```

In[ ]:= size = 60;
TheNegativeVertex = (
  Rasterize[#, RasterSize → size] & /@
  {
    purplering = Graphics3D[{
      Purple, Ring[{0, 0, 0}, 1, 0]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
  purplering,
  Graphics3D[{
    Pink, Ring[{0, 0, 0}, 1.3, 0],
    Blue, Ring[{0, 0, 0}, 0.8, 0]
  },
  ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
  PinkBlueRings[0],
  Graphics3D[{
    Pink, Ring[{-0.625`, 0, 0.3`}, 1.375`, 0.`, ],
    Blue, Ring[{0.625`, 0, -0.3`}, 0.8125`, 0.`, ]
  },
  ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
  PinkBlueRings[-1]
  }
) // GraphicsColumn

```



Out[]=



```
In[ ]:= Export["TheNegativeVertex.png", TheNegativeVertex]
```

Out[]= TheNegativeVertex.png

```

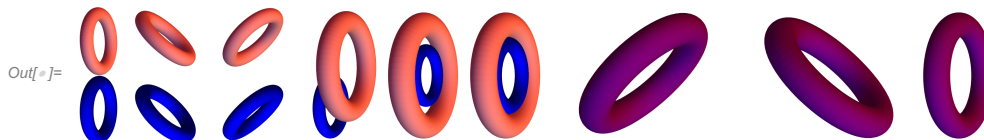
In[ ]:= size = 480;
t = (
  Rasterize[#, RasterSize → size, ImageSize → size] & /@
  {
    Graphics3D[{
      Purple, Ring[{0, 0, 0}, 1, 0]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
    Graphics3D[{
      Purple, Ring[{0, 0, 0}, 1,  $\pi/4$ ]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
    Graphics3D[{
      Purple, Ring[{0, 0, 0}, 1,  $3\pi/4$ ]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
    Graphics3D[{
      Pink, Ring[{0, 0, 0}, 1.3, 0],
      Blue, Ring[{0, 0, 0}, 0.8, 0]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
    PinkBlueRings[0],
    PinkBlueRings[-1/2],
    Graphics3D[{
      Pink, Ring[{-1.25`, 0, 0.`}, 1.` ,  $3\pi/4$ ],
      Blue, Ring[{1.25`, 0, 0.`}, 1.` ,  $3\pi/4$ ]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
    Graphics3D[{
      Pink, Ring[{-1.25`, 0, 0.`}, 1.` ,  $\pi/4$ ],
      Blue, Ring[{1.25`, 0, 0.`}, 1.` ,  $\pi/4$ ]
    },
    ViewPoint → {0, -3, 1.5}, Boxed → False, ImageSize → size
  ],
    PinkBlueRings[-1]
  }
);

```

```

In[ ]:= TheTwistedVertex = ImageRotate[ImageAssemble[List /@ t], Right]

```



```
In[ ]:= Export["TheTwistedVertex.png", TheTwistedVertex]
```

```
Out[ ]:= TheTwistedVertex.png
```