

This is the figure that has a sphere with oriented circles indicating the orientation of a bounding bivector surface. I'd initially dropped this into the trivector introduction as a way of illustrating a possible interpretation of trivector sign geometrically, but it proved more confusing than helpful. The arrowheads in the oriented circles are off in this plot.

```
<< peeters` ;
peeters`setGitDir[ "../project/figures/GAelectrodynamics" ]
/Users/pjoot/project/figures/GAelectrodynamics

ClearAll[sphere, rcap, thetacap, phicap, p, rc, tc, pc]
sphere = RegionPlot3D[x^2+y^2 + z^2 < 1, {x, -1, 1},
  {y, -1, 1}, {z, -1, 1}, PlotPoints → 35, PlotRange → All];

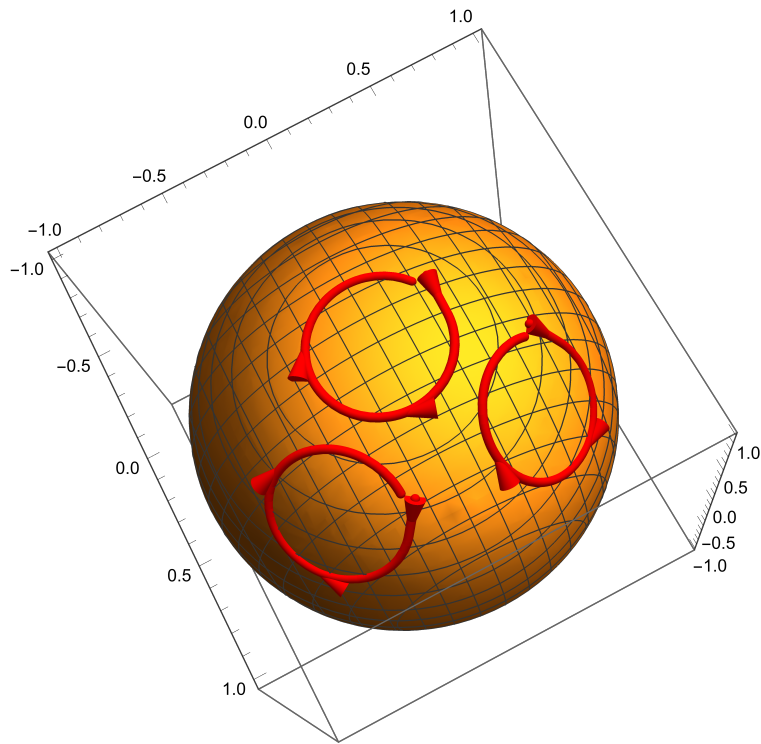
{rc, tc, pc} = CoordinateTransformData[
  "Spherical" → "Cartesian", "OrthonormalBasisRotation", {r, th, ph}];
(*rc
tc
pc*)
rcap[theta_, phi_] = rc /. {{th → theta, ph → phi}}
phicap[theta_, phi_] = pc /. {{th → theta, ph → phi}}
thetacap[theta_, phi_] = tc /. {{th → theta, ph → phi}}
p[dtheta_, alpha_, theta_, phi_] :=
  rcap[theta, phi] Cos[dtheta] +
  (phicap[theta, phi] Cos[alpha] + thetacap[theta, phi] Sin[alpha]) Sin[dtheta]
{{Cos[phi] Sin[theta], Sin[phi] Sin[theta], Cos[theta]}}
{{-Sin[phi], Cos[phi], 0}}
{{Cos[phi] Cos[theta], Cos[theta] Sin[phi], -Sin[theta]}}

circle[theta_, phi_, dtheta_] := Module[{asz},
  asz = 0.05;
  ParametricPlot3D[
    p[dtheta, a, theta, phi], {a, 0, 2 Pi},
    PlotStyle → Directive[Thick, Red]
  ] /. Line[pts_] →
    {Arrowheads[{asz, asz, asz, 0}], Arrow[Tube[pts, {0.02}], {0, .2}]}];
```

```

oriented = Module[{pl},
  pl = 0.25 Pi;
  Show[{sphere, circle[0, 0, Pi / 10],
    circle[pl, pl, Pi / 10], circle[pl, -pl, Pi / 10] }]]

```



```

peeters`exportForLatex["orientedVolumeFig1", oriented]
{orientedVolumeFig1.eps, orientedVolumeFig1pn.png}

```