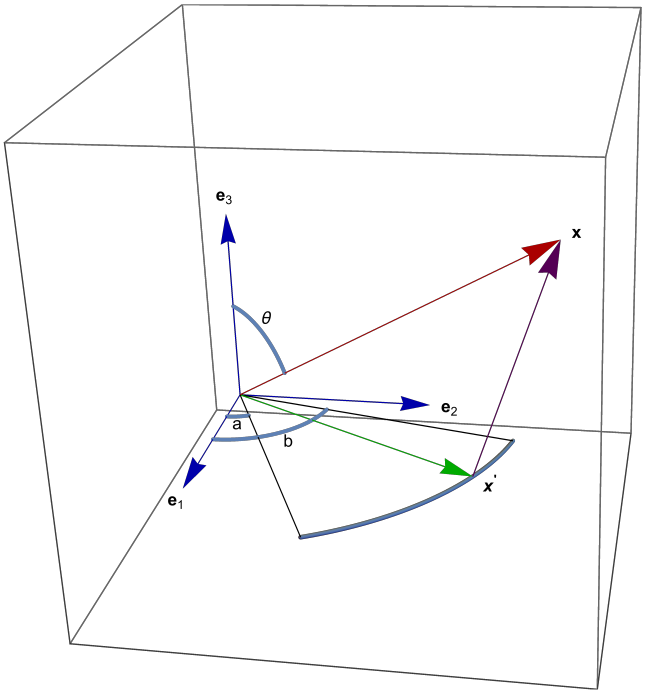
Figure for circular arc of line charge. One arc of charge on the x-y plane at a fixed radius. Field point, azimuthal angles for the range of the line charge.

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

```
/Users/pjoot/project/figures/GAelectrodynamics
```

```
ClearAll[p1, bold]
pt[r_, t_] := r {Cos[t], Sin[t], 0};
bold = Style[ #, Bold] &;

p1 = Module[{rho, o, x, a, b, e1, e2, e3, rcap, theta, phi},
  rho = 1.5;
  o = {0, 0, 0};
  x = {1.5, 1.8, 1.5};
  xp = pt[rho, 1.2 (a + b) / 2];
  a = Pi / 7;
  b = 3 Pi / 7;
  {e1, e2, e3} = UnitVector[3, #] & /@ Range[3];
  theta = ArcCos[rcap.e3];
  rcap = x // Normalize;
  phi = ArcCos[ rcap.e1 / Sin[theta]];

  Show[
   {
    ParametricPlot3D[ pt[rho, t], {t, a, b },
      PlotRange → {{-.2, 2}, {-.2, 2}, {-.2, 2}}, Ticks → None] /.
     Line[pts_] :› {Arrowheads[{0, 0}], Arrow[Tube[pts, {0.01}]]} ,

    ParametricPlot3D[
     0.5 {Sin[t] Cos[phi], Sin[t] Sin[phi], Cos[t]}, {t, 0, theta }],

    ParametricPlot3D[ pt[rho / 6, t], {t, 0, a}],
    ParametricPlot3D[ pt[rho / 3, t], {t, 0, b}],
    Graphics3D[
     {
      Line[{o, pt[rho, a]}],
      Line[{o, pt[rho, b]}],
      Red // Darker,
      Arrow[{o, x}],
      Green // Darker,
      Arrow[{o, xp}],
      Purple // Darker,
      Arrow[{xp, x}],
```

```
      Blue // Darker,
      Arrow[{o, e1}],
      Arrow[{o, e2}],
      Arrow[{o, e3}],
      Black,
      Text["a", pt[1.3 rho / 6, a / 2]],
      Text["b", pt[1.2 rho / 3, b / 2]],
      Text["x'" // bold, xp + Normalize[xp] / 10],
      Text["x" // bold, x + rcap / 10],
      Text[Subscript["e" // bold, 1], 1.1 e1],
      Text[Subscript["e" // bold, 2], 1.1 e2],
      Text[Subscript["e" // bold, 3], 1.1 e3],
      Text["θ",
       0.6 {Sin[t] Cos[phi], Sin[t] Sin[phi], Cos[t]} /. t → theta / 2 ],
     }
     , BaseStyle → 14
    ]
   }
  ]
]
```



```
rcapPlot[rho_, rcap_] := Module[{ e1, e2, e3, theta, phi},

  {e1, e2, e3} = UnitVector[3, #] & /@ Range[3];
  theta = ArcCos[rcap.e3];
  phi = ArcCos[ rcap.e1 / Sin[theta]];

  {{theta, phi} / (Pi / 2) // N,
   ParametricPlot3D[ rho {Sin[t] Cos[phi], Sin[t] Sin[phi], Cos[t]},
    {t, 0, theta }, PlotRange → {{-.2, 2}, {-.2, 2}, {-.2, 2}}
   ]
  }
 ]

(*rcapPlot[ 1, {1,1,2}// Normalize]*)

peeters`exportForLatex["lineChargeArcFig1", p1]
{lineChargeArcFig1.eps, lineChargeArcFig1pn.png}
```