```
(* export function for plot figures *)
<< peeters`
peeters`setGitDir[ "../project/figures/GAelectrodynamics" ]
peeters`

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

Rework the manipulate for figure in reciprocal.tex

```
bold = Style[#, Bold] &;
(*â( â · b ) // FullForm
   â( â ∧ b ) // FullForm*)
ubold = bold["u"];
xbold = bold["x"];
(*tproj=Row[{OverHat[ubold],"(",CenterDot[OverHat[ubold],xbold], ")"}];
trej = Row[{OverHat[ubold],"(",Wedge[OverHat[ubold],xbold], ")"}];*)


(*
*)



(*tproj
 trej*)

mtrej = Row[{"-(", Wedge[xbold, ubold], ")", 1 / ubold}];
ref = Row[{ubold, xbold, 1 / ubold}];

Manipulate[
 DynamicModule[{ bproj, brej, o, s, ao, to, acap, bcap, sqn, tproj, trej},
  o = {0, 0};
  ao = {0, .15};
  s = 0;
  sqn = 5;
  to[start_, end_, ss_ : s] = start + (end - start) (1 + ss / Norm[end - start]);


  acap = a / Norm[a];
  bcap = b / Norm[b];
  bproj = acap (acap.b);
  brej = b - bproj;
```

```
tproj = Row[{Subscript["Proj", ubold], "(", xbold, ")"}];
trej = Row[{Subscript["Rej", ubold], "(", xbold, ")"}];

Graphics[{
  Thick
  , Arrow[{o, b}, ao]

  , Darker[Blue]
  , Arrow[{o, bproj}, ao]

  , Darker[Purple]
  , Arrow[{bproj, a}, ao]

  , Darker[Red]
  , Arrow[{bproj, b}, ao]

  (*, Darker[Green]
  , Arrow[{bproj, bproj-brej}, ao]

  ,Darker[Green]
  , Arrow[{o, bproj-brej}, ao]*)

  , Black
  , PointSize[Large]
  , Point[b]
  (*,PointSize[Large]
  , Point[bproj-brej]*)
  , Text[xbold , to[o, b, 0.3 ], Background → White]
  , Text[ubold , to[o, a ], Background → White]
  , Text[tproj , to[o, bproj / 2], Background → White]
  , Text[trej , to[bproj , bproj + brej / 2 ], Background → White]
  (*, Text[mtrej , to[bproj ,bproj- brej/2 ],Background→White]
  *)
  , Black
  , Opacity[0.5]
  , Parallelogram[bproj, {Normalize[brej] / sqn, Normalize[bproj] / sqn}]

 }
 , Frame → True
 , GridLines → Automatic
 , GridLinesStyle → Directive[Orange, Dashed]
 , BaseStyle → 14 (* this changes the font, making it bigger *)
]
```

```
 ]
 , {{a, {4, 2}}, Locator}
 , {{b, {3, 3}}, Locator}


]




Manipulate[
 DynamicModule[{ bproj, brej, o, s, ao, to, acap, bcap, sqn, tproj, trej},
  o = {0, 0} ;
  ao = {0, .15} ;
  s = 0 ;
  sqn = 5;

  to[start_, end_, ss_ : s] = start + (end - start) (1 + ss / Norm[end - start]) ;


  tproj = Row[{"(", CenterDot[xbold, ubold], ")" , 1 / ubold}];
  trej = Row[{"(", Wedge[xbold, ubold], ")", 1 / ubold}];

  acap = a / Norm[a];
  bcap = b / Norm[b];
  bproj = acap (acap.b);
  brej = b - bproj;


  Graphics[{
    Thick
    , Arrow[{o, b}, ao]

    , Darker[Blue]
    , Arrow[{o, bproj}, ao]

    , Darker[Purple]
    , Arrow[{bproj, a}, ao]

    , Darker[Red]
    , Arrow[{bproj, b}, ao]

    , Darker[Green]
    , Arrow[{bproj, bproj - brej}, ao]

    , Darker[Green]
```
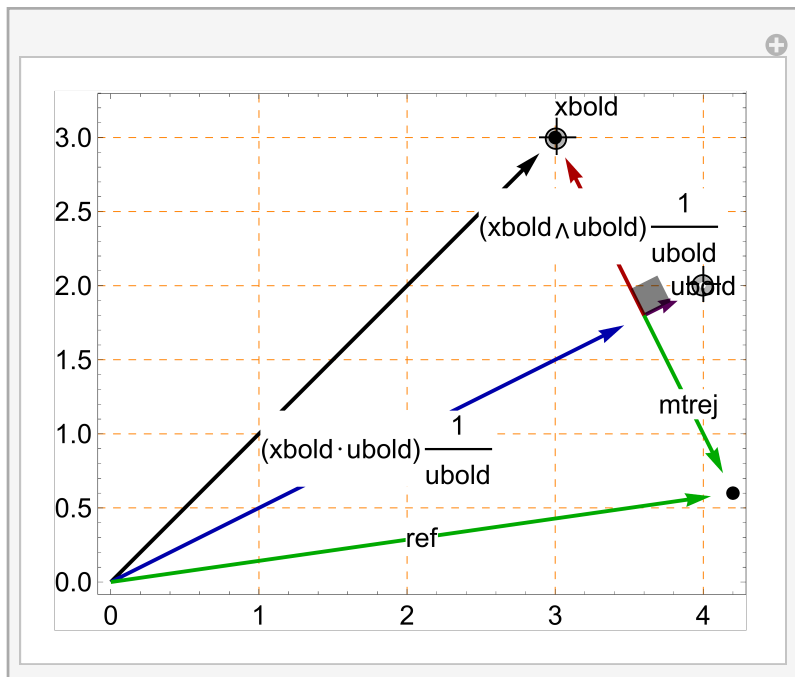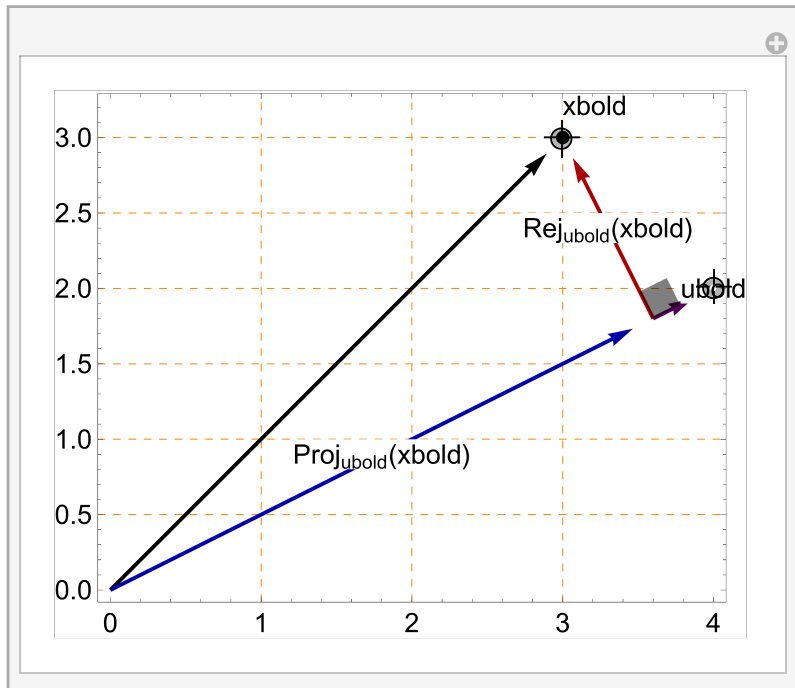
```
      , Arrow[{o, bproj - brej}, ao]


      , Black
      , PointSize[Large]
      , Point[b]
      , PointSize[Large]
      , Point[bproj - brej]
      , Text[xbold , to[o, b, 0.3 ], Background → White]
      , Text[ubold , to[o, a ], Background → White]
      , Text[tproj , to[o, bproj / 2], Background → White]
      , Text[trej , to[bproj , bproj + brej / 2 ], Background → White]
      , Text[mtrej , to[bproj , bproj - brej / 2 ], Background → White]
      , Text[ref , to[o , (bproj - brej) / 2 ], Background → White]
      , Black
      , Opacity[0.5]
      , Parallelogram[bproj, {Normalize[brej] / sqn, Normalize[bproj] / sqn}]



     }
     , Frame → True
     , GridLines → Automatic
     , GridLinesStyle → Directive[Orange, Dashed]
     , BaseStyle → 14 (* this changes the font, making it bigger *)
   ]


  ]
 , {{a, {4, 2}}, Locator}
 , {{b, {3, 3}}, Locator}


]
```
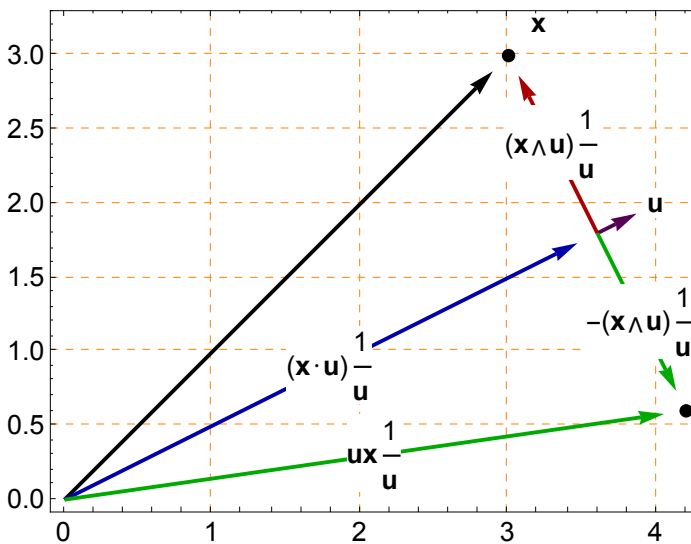
Top diagram labels: xbold, $\mathrm{Rej}_{\mathrm{ubold}}(\mathrm{xbold})$, ubold, $\mathrm{Proj}_{\mathrm{ubold}}(\mathrm{xbold})$

Bottom diagram labels: xbold, $(\mathrm{xbold} \wedge \mathrm{ubold})\dfrac{1}{\mathrm{ubold}}$, ubold, $(\mathrm{xbold} \cdot \mathrm{ubold})\dfrac{1}{\mathrm{ubold}}$, mtrej, ref

```
reflection = DynamicModule[{a = {4, 2}, b = {3, 3}},
   DynamicModule[{bproj, brej, o, s, ao, to, acap, bcap}, o = {0, 0};
    ao = {0, 0.15`};
    s = 0;
    to[start_, end_, ss_ : s] = start + (end - start) (1 + ss/Norm[end - start]);
    acap = a/Norm[a];
    bcap = b/Norm[b];
    bproj = acap acap.b;
    brej = b - bproj;
    Graphics[{Thick, Arrow[{o, b}, ao], Darker[Blue], Arrow[{o, bproj}, ao],
       Darker[Purple], Arrow[{bproj, a}, ao], Darker[Red], Arrow[{bproj, b}, ao],
       Darker[Green], Arrow[{bproj, bproj - brej}, ao], Darker[Green], Arrow[
        {o, bproj - brej}, ao], Black, PointSize[Large], Point[b], PointSize[Large],
       Point[bproj - brej], Text[xbold, to[o, b, 0.3`], Background → White],
       Text[ubold, to[o, a], Background → White], Text[tproj, to[o, bproj/2],
        Background → White], Text[trej, to[bproj, bproj + brej/2], Background → White],
       Text[mtrej, to[bproj, bproj - brej/2], Background → White], Text[ref,
        to[o, (bproj - brej)/2], Background → White]}, Frame → True, GridLines → Automatic,
      GridLinesStyle → Directive[Orange, Dashed], BaseStyle → 14]]]
```
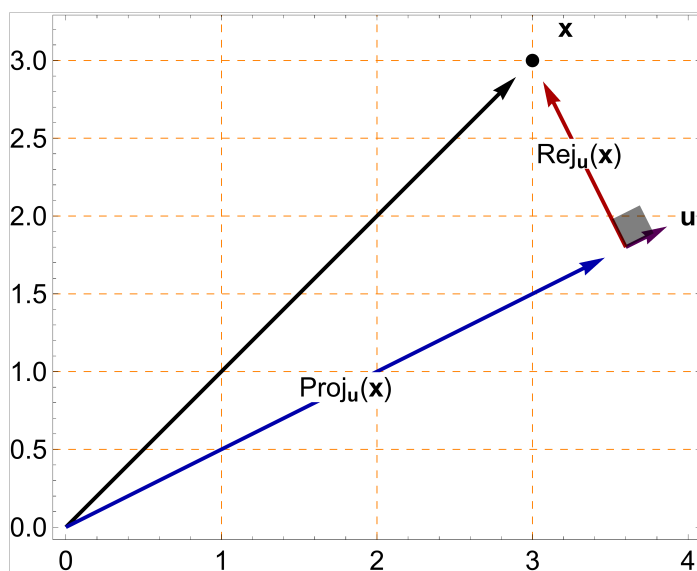
```mathematica
sn = DynamicModule[{a = {4, 2}, b = {3, 3}},
  DynamicModule[{bproj, brej, o, s, ao, to, acap, bcap, sqn, tproj, trej}, o = {0, 0};
   ao = {0, 0.15`};
   s = 0;
   sqn = 5;
   to[start_, end_, ss_ : s] = start + (end - start) (1 + ss/Norm[end - start]);
   tproj = Row[{Subscript["Proj", ubold], "(", xbold, ")"}];
   trej = Row[{Subscript["Rej", ubold], "(", xbold, ")"}];
   acap = a/Norm[a];
   bcap = b/Norm[b];
   bproj = acap acap.b;
   brej = b - bproj;
   Graphics[{Thick, Arrow[{o, b}, ao], Darker[Blue], Arrow[{o, bproj}, ao], Darker[
       Purple], Arrow[{bproj, a}, ao], Darker[Red], Arrow[{bproj, b}, ao], Black,
      PointSize[Large], Point[b], Text[xbold, to[o, b, 0.3`], Background -> White],
      Text[ubold, to[o, a], Background -> White], Text[tproj, to[o, bproj/2],
        Background -> White], Text[trej, to[bproj, bproj + brej/2]], Background -> White]
     , Black
     , Opacity[0.5]
     , Parallelogram[bproj, {Normalize[brej] / sqn, Normalize[bproj] / sqn}]
    }, Frame -> True, GridLines -> Automatic,
    GridLinesStyle -> Directive[Orange, Dashed], BaseStyle -> 14]]]
```
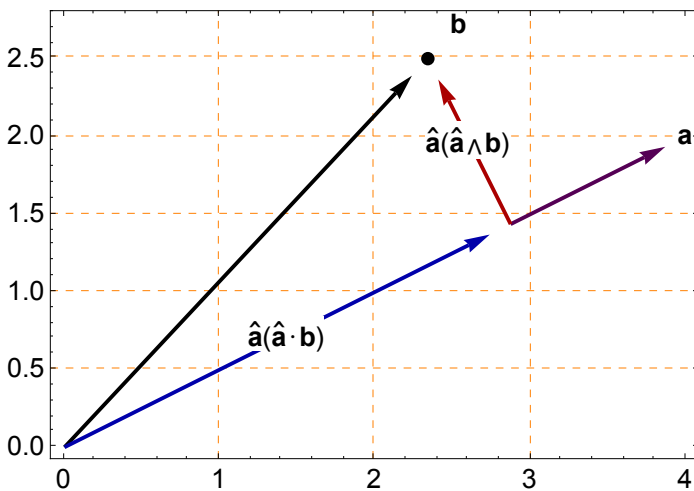
```
sn1 = DynamicModule[{a = {4, 2}, b = {2.338`, 2.5`}},
  DynamicModule[{bproj, brej, o, s, ao, to, acap, bcap}, o = {0, 0};
   ao = {0, 0.15`};
   s = 0;
   to[start_, end_, ss_ : s] = start + (end - start) (1 + ss/Norm[end - start]);
   acap = a/Norm[a];
   bcap = b/Norm[b];
   bproj = acap acap.b;
   brej = b - bproj;
   Graphics[{Thick, Arrow[{o, b}, ao], Darker[Blue], Arrow[{o, bproj}, ao], Darker[
       Purple], Arrow[{bproj, a}, ao], Darker[Red], Arrow[{bproj, b}, ao], Black,
     PointSize[Large], Point[b], Text[xbold, to[o, b, 0.3`]], Background → White],
     Text[ubold, to[o, a], Background → White], Text[tproj, to[o, bproj/2],
      Background → White], Text[trej, to[bproj, bproj + brej/2]], Background → White]},
    Frame → True, GridLines → Automatic, GridLinesStyle →
     Directive[Orange, Dashed], BaseStyle → 14]]]
```



```
peeters`exportForLatex["projectionAndRejectionFig1", sn]
{projectionAndRejectionFig1.eps, projectionAndRejectionFig1pn.png}


peeters`exportForLatex["reflectionFig1", reflection]
{reflectionFig1.eps, reflectionFig1pn.png}
```