### 3 Comparison of Lens types

```mathematica
Needs["Optica`Optica`"]

doublet = DataToOptica[LensDoublet, FocalLength -> 100, ComponentBoundary -> 50]


ManipulateSystem[
  Table[Move[SingleRay[NumberOfRays -> 11, WaveLength -> lam], {0, {ys + f, 0}}], {f, 0, 1, .1}],
  Move[PlanoConvexLens[100, 50, 10], {{x1, 50}, {y - 1, -1}}],
  Move[PlanoConvexLens[100, 50, 10, CurvatureDirection -> Back], {{x2, 50}, {y - 100, -100}}],
  Move[SphericalLens[57.3607849244404375, -385.36854412733703, 50, 10],
    {{x3, 50}, {y - 200, -200}}],
  Move[BiConvexLens[100, 50, 10], {{x4, 50}, {y - 300, -300}}],
  Move[doublet, {{x5, 41.9}, {y - 400, -400}}],
  Move[PlanoConvexLens[100, 50, 5, ComponentMedium -> Sapphire], {{x7, 50}, {y - 500, -500}}],
  Move[Screen[30], {x, 151}], Boundary[175, 75, GraphicDesign -> False] ,
  {{lam, .532}, .4, .7},
  {{y, 1, "Lens Type"}, (1 -> "Plano-Convex (BK7)", 100 -> "Reversed Plano-Convex (BK7)",
    200 -> "\"Best Form\" Shape (BK7)\", 300 -> "Bi-Convex (BK7)\", 400 -> "Lens Doublet (BK7,F4)"},
    500 -> "Plano-Convex (Sapphire)")}, Column[{Dynamic[Frame -> TopView,
      PlotLabel -> "Comparison of Different Lens Types (Focal Length = 100 mm)"],
      PlotRange -> {{-3, 175}, {-30, 30}}, Frame -> True},
    Row[{Dynamic[Frame -> TopView, PlotLabel -> "Magnified Trace Near Focal Plane",
      PlotRange -> Dynamic[{{x - 1, x + 1}, {-1, 1}}], Frame -> True, ImageSize -> 400],
      Dynamic[Frame -> OpticalPathDifference, PlotRange -> All,
        PlotLabel -> "Optical Path Difference (wavelengths) vs Trace Position",
        AspectRatio -> 1, ReportedSurfaces -> 7)]}]]]]

SymbolicValues -> {ys -> 10, y -> 1}, SliderLabelReplacements ->
  {"ys" -> "Beam Width", "lam" -> "Wavelength"},
OutputType -> Notebook]
```

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Plano-Convex (Sapphire)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.532</td>
</tr>
</tbody>
</table>

Comparison of Different Lens Types (Focal Length = 100 mm)
Comparison of Different Lens Types

H: Focal Length = 100 mm

Magnified Trace Near Focal Plane

Optical Path Difference

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Comparison of Different Lens Types (Focal Length = 100 mm)

Lens Type: Plano-Convex (BK7)

Wavelength: 0.532
Comparison of Different Lens Types

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Reversed Plano–Convex (BK7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>0.6465</td>
</tr>
</tbody>
</table>

Optical Path Difference vs Trace Position
Comparison of Different Lens Types (Focal Length = 100 mm)

Magnified Trace Near Focal Plane

Optical Path Difference
Comparison of Different Lens Types (Focal Length = 100 mm)
Comparison of Different Lens Types

H Focal Length = 100 mm

Magnified Trace Near Focal Plane

Optical Path Difference

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