

Pensieve header: A collection of 4-dimensional hardware pieces.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2013-12\\4DHardware"]
```

```
C:\\drorbn\\AcademicPensieve\\2013-12\\4DHardware
```

```
MakeImage["4DHardware-01",
```

```
Graphics3D[{
```

```
  Opacity[0.85],
```

```
  Glow[Red], Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
```

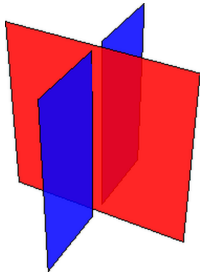
```
  Glow[Blue],
```

```
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, -1, 10}, {0, -1, -10}}],
```

```
  Polygon[{{0, 10, -10}, {0, 10, 10}, {0, 1, 10}, {0, 1, -10}}]
```

```
}, Lighting -> None, Boxed -> False],
```

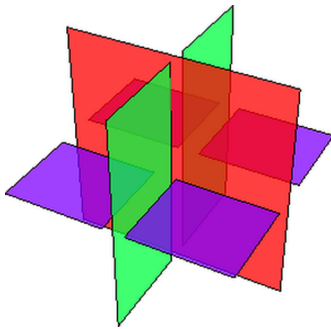
```
ImageSize -> 300]
```



```

MakeImage["4DHardware-02",
Graphics3D[{
  Opacity[0.75],
  Glow[Hue[0]], Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
  Glow[Hue[3/8]],
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, -1, 10}, {0, -1, -10}}],
  Polygon[{{0, 10, -10}, {0, 10, 10}, {0, 1, 10}, {0, 1, -10}}],
  Glow[Hue[3/4]],
  Polygon[{{1, 10, 0}, {1, 2, 0}, {10, 2, 0}, {10, 10, 0}}],
  Polygon[{{-1, 10, 0}, {-1, 2, 0}, {-10, 2, 0}, {-10, 10, 0}}],
  Polygon[{{-1, -10, 0}, {-1, -2, 0}, {-10, -2, 0}, {-10, -10, 0}}],
  Polygon[{{1, -10, 0}, {1, -2, 0}, {10, -2, 0}, {10, -10, 0}}]
}, Lighting -> None, Boxed -> False],
ImageSize -> 300]

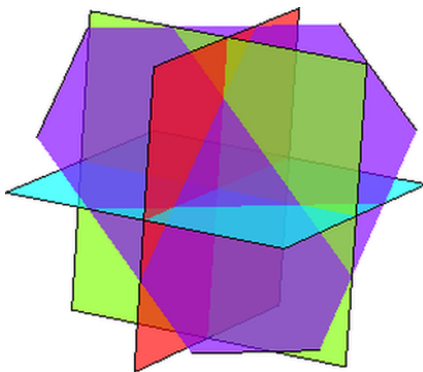
```



```

MakeImage["4DHardware-03",
Graphics3D[{
  Opacity[0.65],
  Glow[Hue[0/4]],
  Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
  Glow[Hue[1/4]],
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, 10, 10}, {0, 10, -10}}],
  Glow[Hue[2/4]],
  Polygon[{{-10, 10, 0}, {-10, -10, 0}, {10, -10, 0}, {10, 10, 0}}],
  Glow[Hue[3/4]],
  Polygon[10 {{2, -1, -1}, {-1, 2, -1}, {-1, -1, 2}} + 2 {1, 1, 1}]
},
Boxed → False, ImageSize → {390, Automatic}, Lighting → None, PlotRange → 10,
ViewPoint → {24.7, 12.5, 7.45}, ViewVertical → {-0.072, -0.109, 0.991}
],
ImageSize → 300]

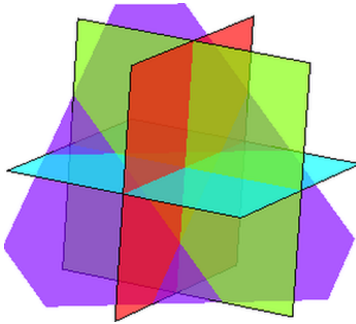
```



```

MakeImage["4DHardware-04",
Graphics3D[{
  Opacity[0.65],
  Glow[Hue[0/4]],
  Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
  Glow[Hue[1/4]],
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, 10, 10}, {0, 10, -10}}],
  Glow[Hue[2/4]],
  Polygon[{{-10, 10, 0}, {-10, -10, 0}, {10, -10, 0}, {10, 10, 0}}],
  Glow[Hue[3/4]],
  Polygon[10 {{2, -1, -1}, {-1, 2, -1}, {-1, -1, 2}} - 2 {1, 1, 1}]
},
Boxed -> False, ImageSize -> {390, Automatic}, Lighting -> None, PlotRange -> 10,
ViewPoint -> {24.7, 12.5, 7.45}, ViewVertical -> {-0.072, -0.109, 0.991}
],
ImageSize -> 300]

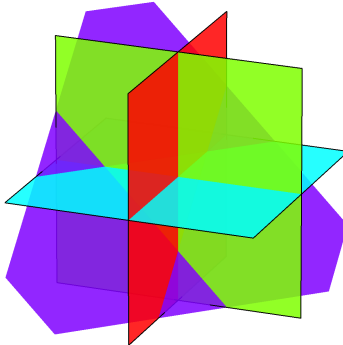
```



```

Column[{
  Slider[Dynamic[s], {-2, 2}],
  Dynamic[Graphics3D[{
    Opacity[0.85],
    Glow[Hue[0/4]],
    Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
    Glow[Hue[1/4]],
    Polygon[{{0, -10, -10}, {0, -10, 10}, {0, 10, 10}, {0, 10, -10}}],
    Glow[Hue[2/4]],
    Polygon[{{-10, 10, 0}, {-10, -10, 0}, {10, -10, 0}, {10, 10, 0}}],
    Glow[Hue[3/4]],
    Polygon[10 {{2, -1, -1}, {-1, 2, -1}, {-1, -1, 2}} + s {1, 1, 1}]
  ],
  Lighting -> None, Boxed -> False,
  PlotRange -> 10, ViewPoint -> {25, 10, 10}
]]
}]

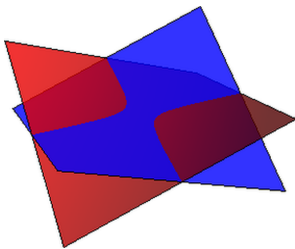
```



```

MakeImage["4DHardware-05",
  Plot3D[{x y, -0.1 - x y}, {x, -2, 2}, {y, -2, 2},
    BoxRatios → {1, 1, 0.4`}, Boxed → False, ImageSize → {315.1729630273366`, 260.`},
    Method → {"RotationControl" → "Globe"}, PlotRange → {{-2, 2}, {-2, 2}, All},
    PlotRangePadding → {Scaled[0.02`], Scaled[0.02`], Scaled[0.02`]},
    ViewPoint → {-2.580627656842925`, -0.9026639334946656`, -1.9938803173473902`},
    ViewVertical → {0.`, 0.`, -1.``},
    PlotStyle → {{Opacity[0.8], Red}, {Opacity[0.8], Blue}},
    Mesh → False, PlotPoints → 50, Boxed → False, Axes → False
  ],
  ImageSize → 300
]

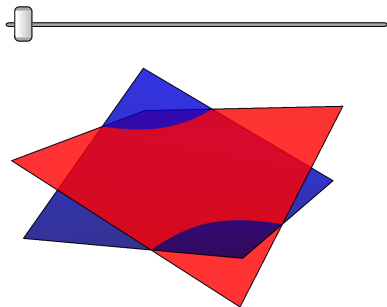
```



```

Column[{
  Slider[Dynamic[h], {-2, 2}],
  Dynamic[Plot3D[{x y, h - x y}, {x, -2, 2}, {y, -2, 2},
    PlotStyle → {{Opacity[0.8], Red}, {Opacity[0.8], Blue}}, Mesh → False,
    PlotPoints → 50, Boxed → False, Axes → False, PlotRange → All
  ]
]}]

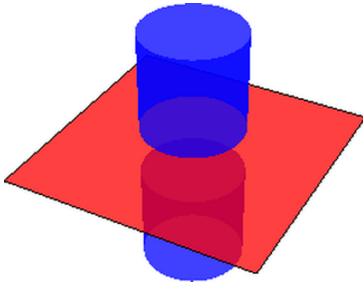
```



```

MakeImage["4DHardware-06",
Graphics3D[{
  Opacity[0.75],
  Glow[Red], Polygon[{{-10, -10, 0}, {-10, 10, 0}, {10, 10, 0}, {10, -10, 0}}],
  Glow[Blue], CapForm[None],
  Tube[{{0, 0, 2}, {0, 0, 10}}, 4],
  Tube[{{0, 0, -2}, {0, 0, -10}}, 4]
}, Lighting → None, Boxed → False],
ImageSize → 300]

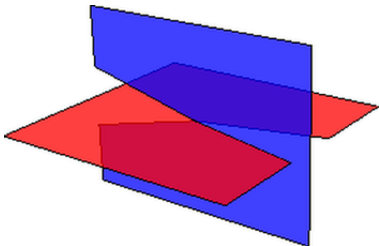
```



```

MakeImage["4DHardware-07",
Graphics3D[{
  Opacity[0.75],
  Glow[Red],
  Polygon[
    {{-4, -4, 0}, {-4, 4, 0}, {4, 4, 0}, {4, 1, 0}, {0, 0, 0}, {4, -1, 0}, {4, -4, 0}}],
  Glow[Blue],
  Polygon[
    {{-4, 0, -3}, {-4, 0, -1}, {0, 0, 0}, {-4, 0, 1}, {-4, 0, 3}, {4, 0, 3}, {4, 0, -3}}]
},
Boxed → False, Axes → False, PlotRange → All, Lighting → None,
ViewPoint → {1.94, -2.46, 1.25}, ViewVertical → {0.17, -0.17, 1.29}
],
ImageSize → 300]

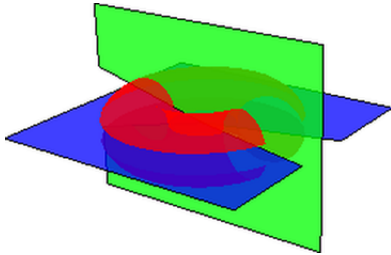
```



```

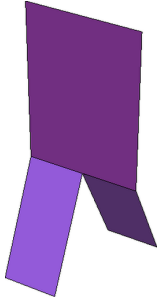
MakeImage["4DHardware-08",
  Show[ParametricPlot3D[
    {(2 + Cos[β]) Cos[α], (2 + Cos[β]) Sin[α], Sin[β]},
    {α,  $\frac{\pi}{10}$ , 2π -  $\frac{\pi}{10}$ }, {β,  $\frac{\pi}{10}$ , 2π -  $\frac{\pi}{10}$ },
    Mesh → False, PlotStyle → {Glow[Red], Opacity[0.75]}
  ],
  Graphics3D[{
    Opacity[0.75],
    Glow[Blue],
    Polygon[
      {{-4, -4, 0}, {-4, 4, 0}, {4, 4, 0}, {4, 1, 0}, {0, 0, 0}, {4, -1, 0}, {4, -4, 0}}],
    Glow[Green],
    Polygon[{{-4, 0, -3}, {-4, 0, -1},
      {0, 0, 0}, {-4, 0, 1}, {-4, 0, 3}, {4, 0, 3}, {4, 0, -3}}]
  ]],
  Boxed → False, Axes → False, PlotRange → All, Lighting → None,
  ViewPoint → {1.94, -2.46, 1.25}, ViewVertical → {0.17, -0.17, 1.29}
],
  ImageSize → 300]

```

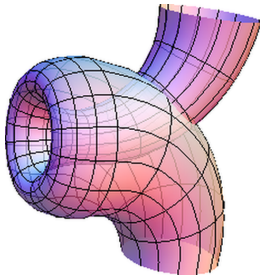


(* Based on Classes/13-Aarhus/Shpagat.nb *)

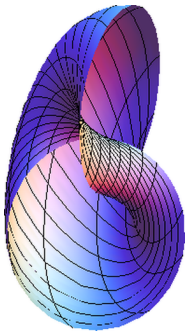
```
MakeImage["4DHardware-09",  
Graphics3D[  
  Polygon[{{1, 0, 0}, {1, 0, 3}, {-1, 0, 3}, {-1, 0, 0}}],  
  Polygon[{{1, 0, 0}, {1, 1, -2}, {0, 1, -2}, {0, 0, 0}}],  
  Polygon[{{-1, 0, 0}, {-1, -1, -2}, {0, -1, -2}, {0, 0, 0}}]  
], Boxed -> False],  
ImageSize -> 300]
```



```
(* Based on Projects/WKO/Wen.nb *)
MakeImage["4DHardware-10",
  {r0, r1, r2, r3} = {5, 1, 2, 3}; (* the radii of the bends,
  the narrow, the connect, and the wide *)
p[u_, v_] := Which[
  v < 0, (* the narrow tube *)
    {-r0 + r0 * Cos[v], 0, -r0 * Sin[v]} +
    (r1 - (r2 - r1) 2 v / Pi) * {-Cos[u] * {-Cos[v], 0, Sin[v]} + {0, Sin[u], 0}},
  v < Pi, (* the bend *)
    {((r1 + r3) - (r3 - r1) * Cos[v]) * Cos[u],
    ((r1 + r3) - (r3 - r1) * Cos[v]) * Sin[u], -(r1 + r3) * Sin[v]} / 2,
  v < 3 Pi / 2, (* the wide tube *)
    {r0 + r0 * Cos[v], 0, -r0 * Sin[v]} +
    (r3 - 2 (r3 - r2) (v - Pi) / Pi) * {Cos[u] * {-Cos[v], 0, Sin[v]} + {0, Sin[u], 0}}
];
ParametricPlot3D[
  p[u, v],
  {u, 0, 2 Pi}, {v, -Pi / 2, 3 Pi / 2},
  PlotStyle -> Opacity[0.75], Axes -> None, Boxed -> False,
  ViewPoint -> {-0.785, -2.78, -1.74}, ViewVertical -> {-0.863, -0.595, -0.394}
],
ImageSize -> 300]
```

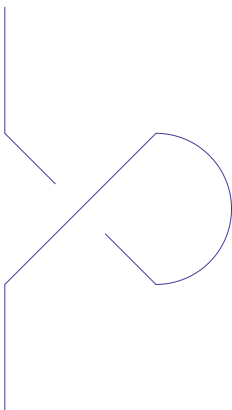


```
(* With formulas from Projects/PlanetHopf/ *)
MakeImage["4DHardware-11", p[z_, w_] := {Re[z], Im[z], Re[z] + Im[w]};
p[z_, w_] :=  $\frac{1}{1 - \text{Im}[w]}$  {Re[z], Im[z], Re[w]};
p[l_List] := p @@ l;
ParametricPlot3D[
  p[ $\frac{\sqrt{2}}{2} e^{i\alpha} \{e^{i\phi}, 1\}$ ],
  {phi, 0, pi}, {alpha, 0, 2 pi},
  Axes -> None, Boxed -> False,
  ViewPoint -> {3.13364, 0.01505, -1.25003},
  ViewVertical -> {0.178547, -0.953207, -0.663175}
],
ImageSize -> 300]
```



$$x[s_] := \begin{cases} \{0, s+7\} & s \leq -10 \\ \{s+10, s+7\} & -10 < s \leq -4 \\ \{6 + 3 \cos[\frac{\pi s}{8}], -3 \sin[\frac{\pi s}{8}]\} & -4 < s \leq 4 \\ \{10 - s, s-7\} & 4 < s \leq 6 \\ \{10 - s, s-7\} & 8 < s \leq 10 \\ \{0, s-7\} & 10 < s \end{cases}$$

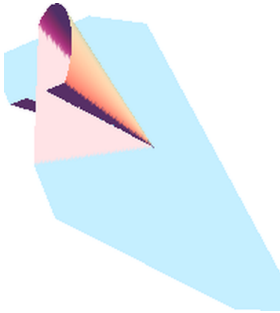
```
ParametricPlot[x[s], {s, -15, 15}, Axes -> None]
```



```

MakeImage["4DHardware-12",
  KK[s_, t_] := If[t > 0,
    Append[t KK[15 s / t] / 9, t],
    {0, 15 s / 9, t}
  ];
ParametricPlot3D[KK[s, t], {s, -1, 1}, {t, -0.5, 1},
  PlotRange -> All, PlotPoints -> 50, Mesh -> None, Axes -> None, Boxed -> False,
  ViewPoint -> {1.66, -2.56, 1.46}, ViewVertical -> {2.81, -0.33, 0.93}
],
ImageSize -> 300]

```



```

MakeImage["4DHardware-13",
  ParametricPlot3D[
    {t Cos[α], t Sin[2 α] / 2, 1 - t},
    {α, π / 2 + π / 24, 5 π / 2 - π / 24}, {t, 0, 1},
    ColorFunction -> Function[{x, y, z, α, t}, Glow[Hue[3 / 8 (1 + Sin[α]) t]]],
    ColorFunctionScaling -> False,
    Lighting -> None, Boxed -> False, Axes -> None, Mesh -> False,
    PlotStyle -> Opacity[0.8], ViewPoint -> {-1.078, 2.84056, -1.47504},
    ViewVertical -> {-0.875417, 0.787683, -0.560478}
  ],
  ImageSize -> 300]

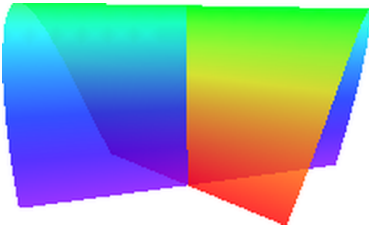
```



```

MakeImage["4DHardware-14",
  ParametricPlot3D[
    {t Cos[α], t Sin[α], Sin[2 α]},
    {α, 0, π/2}, {t, -1, 1},
    ColorFunction → Function[{x, y, z, α, t}, Glow[Hue[ $\frac{3\alpha}{2\pi}$ ]]],
    ColorFunctionScaling → False,
    Lighting → None, Boxed → False, Axes → None, Mesh → False,
    PlotStyle → Opacity[0.8], ViewPoint → {2.92229, -1.60047, 0.552585},
    ViewVertical → {0.694529, -0.375278, 1.22767}
  ],
  ImageSize → 300]

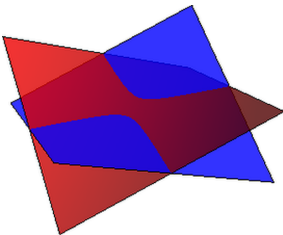
```



```

MakeImage["4DHardware-15",
  Plot3D[{x y, 0.1 - x y}, {x, -2, 2}, {y, -2, 2},
    BoxRatios → {1, 1, 0.4}, Boxed → False, ImageSize → {315.1729630273366, 260.},
    Method → {"RotationControl" → "Globe"}, PlotRange → {{-2, 2}, {-2, 2}, All},
    PlotRangePadding → {Scaled[0.02], Scaled[0.02], Scaled[0.02]},
    ViewPoint → {-2.580627656842925, -0.9026639334946656, -1.9938803173473902},
    ViewVertical → {0., 0., -1.},
    PlotStyle → {{Opacity[0.8], Red}, {Opacity[0.8], Blue}},
    Mesh → False, PlotPoints → 50, Boxed → False, Axes → False
  ],
  ImageSize → 300
]

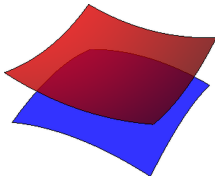
```



```

MakeImage["4DHardware-16",
  α = 0.8;
  Plot3D[{{1 - α (1 - (x^2 + y^2)/8)}, -1 + α (1 - (x^2 + y^2)/8)}, {x, -2, 2}, {y, -2, 2},
  BoxRatios -> {1, 1, 0.4}, Boxed -> False, PlotRange -> {{-2, 2}, {-2, 2}, {-1, 1}},
  PlotStyle -> {{Opacity[0.8], Red}, {Opacity[0.8], Blue}},
  Mesh -> False, PlotPoints -> 50, Boxed -> False, Axes -> False
],
ImageSize -> 300
]

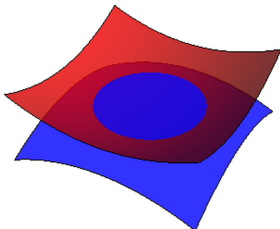
```



```

MakeImage["4DHardware-17",
  α = 1.2;
  Plot3D[{{1 - α (1 - (x^2 + y^2)/8)}, -1 + α (1 - (x^2 + y^2)/8)}, {x, -2, 2}, {y, -2, 2},
  BoxRatios -> {1, 1, 0.4}, Boxed -> False, PlotRange -> {{-2, 2}, {-2, 2}, {-1, 1}},
  PlotStyle -> {{Opacity[0.8], Red}, {Opacity[0.8], Blue}},
  Mesh -> False, PlotPoints -> 50, Boxed -> False, Axes -> False
],
ImageSize -> 300
]

```

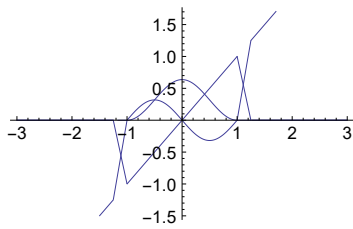


```

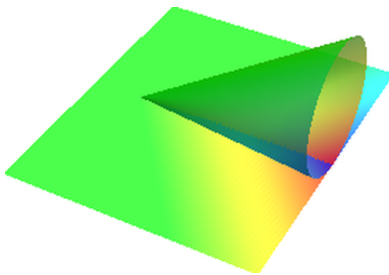
Kink[s_, t_] := If[s ≤ 0, {t, 0, 0}, (* s is size, t is time *)
  {
    {t, 0, 0}                                t < -1.25 s
    {5 t + 5 s, 0, -4 t - 5 s}              -1.25 s ≤ t < -s
    {s/π {-Sin[π t/s], 1 + Cos[π t/s]}, π t/s}  -s ≤ t ≤ s
    {5 t - 5 s, 0, -4 t + 5 s}              s < t ≤ 1.25 s
    {t, 0, 0}                                t > 1.25 s
  }

```

```
Plot[Kink[1, t], {t, -3, 3}]
```



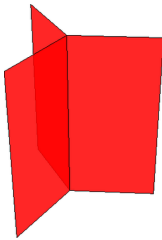
```
MakeImage["4DHardware-18",
  ParametricPlot3D[{s, Kink[s, t][[1]], Kink[s, t][[2]]},
    {s, -0.25, 1}, {t, -1.75, 1.75},
    ColorFunction -> Function[{x, y, z, s, t}, Hue[ $\frac{1 + \text{Kink}[s, t][[3]]}{3}$ ]],
    ColorFunctionScaling -> False,
    PlotRange -> {{-0.25, 1}, {-0.75, 0.75}, {0, 0.75}}, Mesh -> False,
    Boxed -> False, Axes -> False, PlotStyle -> {Opacity[0.7]}, PlotPoints -> 150
  ],
  ImageSize -> 300
]
```



```

MakeImage["4DHardware-19",
Graphics3D[{
  Opacity[0.85], Glow[Red],
  Polygon[{{0, 0, -1}, {0, 0, 1}, {1, 0, 1}, {1, 0, -1}}],
  Polygon[{{0, 0, -1}, {0, 0, 1}, {-1/2, sqrt(3)/2, 1}, {-1/2, sqrt(3)/2, -1}],
  Polygon[{{0, 0, -1}, {0, 0, 1}, {-1/2, -sqrt(3)/2, 1}, {-1/2, -sqrt(3)/2, -1}],
}, Lighting -> None, Boxed -> False, ViewPoint -> {0.174611, -2.89946, 1.73569},
ViewVertical -> {0.00615481, -0.107975, 0.995608}],
ImageSize -> 300]

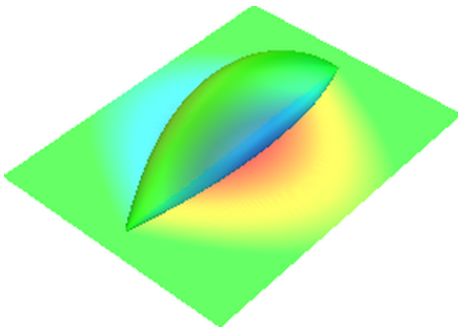
```



```

σ[s_, t_] := {s}~Join~Kink[0.75 - s^2, t];
MakeImage["4DHardware-20",
ParametricPlot3D[σ[s, t][[1 ;; 3]],
  {s, -1, 1}, {t, -1.75, 1.75},
  ColorFunction -> Function[{x, y, z, s, t}, Hue[2/3 + σ[s, t][[4]]]],
  ColorFunctionScaling -> False, PlotRange -> {{-1, 1}, {-0.75, 0.75}, {0, 0.75}},
  Mesh -> False, Boxed -> False, Axes -> False, PlotStyle -> {Opacity[0.6]},
  PlotPoints -> 200, ViewPoint -> {-1.9772, -1.66109, 2.18665},
  ViewVertical -> {0.0420887, 0.0784289, 2.65968}
],
ImageSize -> 300
]

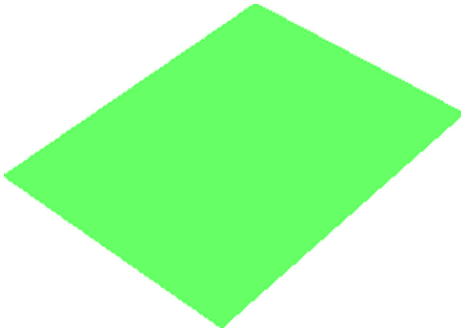
```




```

σ[s_, t_] := {s}~Join~Kink[0, t];
MakeImage["4DHardware-21",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + \sigma[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False, PlotRange → {{-1, 1}, {-0.75, 0.75}, {0, 0.75}},
    Mesh → False, Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 200, ViewPoint → {-1.9772, -1.66109, 2.18665},
    ViewVertical → {0.0420887, 0.0784289, 2.65968}
  ],
  ImageSize → 300
]

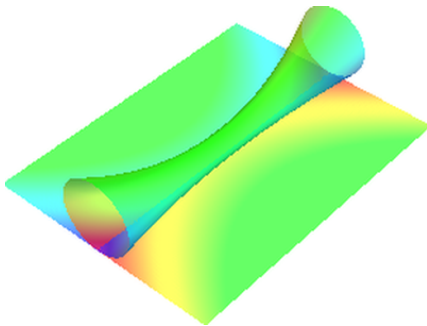
```



```

σ[s_, t_] := {s}~Join~Kink[0.25 +  $\frac{s^2}{2}$ , t];
MakeImage["4DHardware-22",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + σ[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False, PlotRange → {{-1, 1}, {-0.75, 0.75}, {0, 0.75}},
    Mesh → False, Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 250, ViewPoint → {-1.9772, -1.66109, 2.18665},
    ViewVertical → {0.0420887, 0.0784289, 2.65968}
  ],
  ImageSize → 300
]

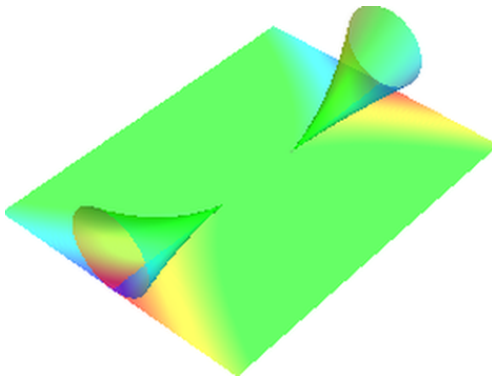
```



```

σ[s_, t_] := {s}~Join~Kink[0.8 s2 - 0.05, t];
MakeImage["4DHardware-23",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + \sigma[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False, PlotRange → {{-1, 1}, {-0.75, 0.75}, {0, 0.75}},
    Mesh → False, Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 250, ViewPoint → {-1.9772, -1.66109, 2.18665},
    ViewVertical → {0.0420887, 0.0784289, 2.65968}
  ],
  ImageSize → 300
]

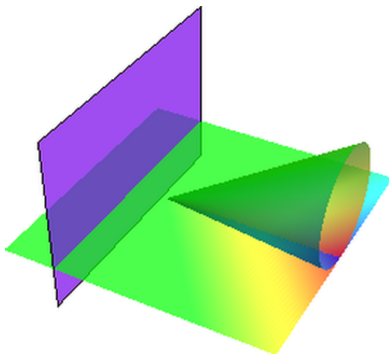
```



```

MakeImage["4DHardware-24",
  Show[
    ParametricPlot3D[{s, Kink[s, t][[1]], Kink[s, t][[2]]},
      {s, -0.5, 1}, {t, -1.75, 1.75},
      ColorFunction -> Function[{x, y, z, s, t}, Hue[ $\frac{1 + \text{Kink}[s, t][[3]]}{3}$ ]],
      ColorFunctionScaling -> False,
      PlotRange -> {{-0.5, 1}, {-0.75, 0.75}, {-0.25, 0.75}}, Mesh -> False,
      Boxed -> False, Axes -> False, PlotStyle -> {Opacity[0.7]}, PlotPoints -> 150
    ],
    Graphics3D[{Opacity[0.7], Hue[0.75],
      Polygon[{{-0.2, -0.75, -0.25},
        {-0.2, -0.75, 0.75}, {-0.2, 0.75, 0.75}, {-0.2, 0.75, -0.25}}]
    }
  ],
  ImageSize -> 300
]

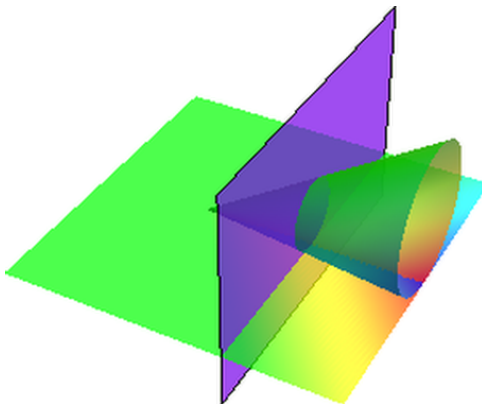
```



```

MakeImage["4DHardware-25",
  Show[
    ParametricPlot3D[{s, Kink[s, t][[1]], Kink[s, t][[2]]},
      {s, -0.5, 1}, {t, -1.75, 1.75},
      ColorFunction -> Function[{x, y, z, s, t}, Hue[ $\frac{1 + \text{Kink}[s, t][[3]]}{3}$ ]],
      ColorFunctionScaling -> False,
      PlotRange -> {{-0.5, 1}, {-0.75, 0.75}, {-0.25, 0.75}}, Mesh -> False,
      Boxed -> False, Axes -> False, PlotStyle -> {Opacity[0.7]}, PlotPoints -> 150
    ],
    Graphics3D[{Opacity[0.7], Hue[0.75]},
      Polygon[{{0.5, -0.75, -0.25},
        {0.5, -0.75, 0.75}, {0.5, 0.75, 0.75}, {0.5, 0.75, -0.25}}]
    ]
  ],
  ImageSize -> 300
]

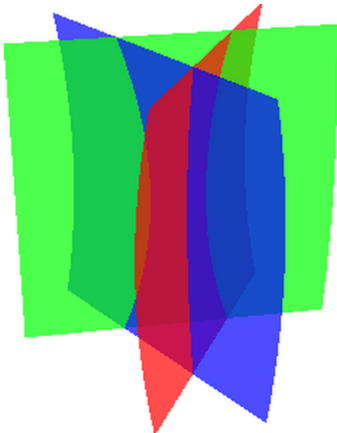
```



```

MakeImage["4DHardware-26",
Show[
ParametricPlot3D[
Append[0.2 (1 - 0.5 (1 - z2)) {1, 0} + t {0, 1}, z], {t, -1, 1}, {z, -1, 1},
Mesh → False, Boxed → False, Axes → False,
PlotStyle → {Glow[Hue[0]], Opacity[0.7]}, Lighting → None],
ParametricPlot3D[Append[0.2 (1 - 0.5 (1 - z2)) {-1/2, √3/2} + t {√3/2, 1/2}, z],
{t, -1, 1}, {z, -1, 1},
Mesh → False, Boxed → False, Axes → False,
PlotStyle → {Glow[Hue[1/3]], Opacity[0.7]}, Lighting → None],
ParametricPlot3D[Append[0.2 (1 - 0.5 (1 - z2)) {-1/2, -√3/2} + t {-√3/2, 1/2}, z],
{t, -1, 1}, {z, -1, 1},
Mesh → False, Boxed → False, Axes → False,
PlotStyle → {Glow[Hue[2/3]], Opacity[0.7]}, Lighting → None],
PlotRange → All, ViewPoint → {1.07475, -2.85045, 1.47304},
ViewVertical → {0.0785897, -0.166645, 0.983457}
],
ImageSize → 300
]

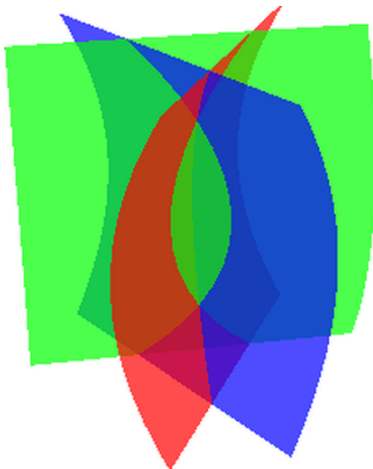
```



```

MakeImage["4DHardware-27",
Show[
ParametricPlot3D[
Append[0.2 (1 - 1.5 (1 - z^2)) {1, 0} + t {0, 1}, z], {t, -1, 1}, {z, -1, 1},
Mesh -> False, Boxed -> False, Axes -> False,
PlotStyle -> {Glow[Hue[0]], Opacity[0.7]}, Lighting -> None],
ParametricPlot3D[Append[0.2 (1 - 1.5 (1 - z^2)) {-1/2, sqrt(3)/2} + t {sqrt(3)/2, 1/2}, z],
{t, -1, 1}, {z, -1, 1},
Mesh -> False, Boxed -> False, Axes -> False,
PlotStyle -> {Glow[Hue[1/3]], Opacity[0.7]}, Lighting -> None],
ParametricPlot3D[Append[0.2 (1 - 1.5 (1 - z^2)) {-1/2, -sqrt(3)/2} + t {-sqrt(3)/2, 1/2}, z],
{t, -1, 1}, {z, -1, 1},
Mesh -> False, Boxed -> False, Axes -> False,
PlotStyle -> {Glow[Hue[2/3]], Opacity[0.7]}, Lighting -> None],
PlotRange -> All, ViewPoint -> {1.07475, -2.85045, 1.47304},
ViewVertical -> {0.0785897, -0.166645, 0.983457}
],
ImageSize -> 300
]
]

```



```

Kink2[s_, t_] := If[s <= 0, {t, -t^2, 0}, (* s is size, t is time *)

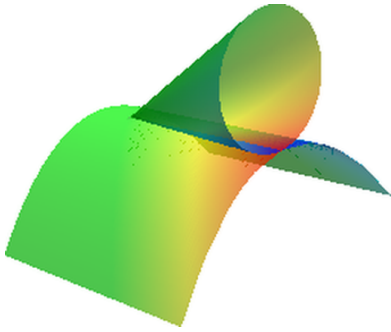
```

$$\left[\begin{array}{ll}
 \{t, -t^2, 0\} & t < -1.25 s \\
 \{5 t + 5 s, -(5 t + 5 s)^2, -4 t - 5 s\} & -1.25 s \leq t < -s \\
 \frac{s}{\pi} \left\{ -\text{Sin}\left[\frac{\pi t}{s}\right], 1 + \text{Cos}\left[\frac{\pi t}{s}\right], \frac{\pi t}{s} \right\} & -s \leq t \leq s \\
 \{5 t - 5 s, -(5 t - 5 s)^2, -4 t + 5 s\} & s < t \leq 1.25 s \\
 \{t, -t^2, 0\} & t > 1.25 s
 \end{array} \right]$$

```

MakeImage["4DHardware-28",
  ParametricPlot3D[{s, Kink2[s, t][[1]], Kink2[s, t][[2]]},
    {s, -0.25, 1}, {t, -1.75, 1.75},
    ColorFunction -> Function[{x, y, z, s, t}, Hue[ $\frac{1 + \text{Kink2}[s, t][[3]]}{3}$ ]],
    ColorFunctionScaling -> False,
    PlotRange -> {{-0.25, 1}, {-0.75, 0.75}, {-0.5, 0.75}}, Mesh -> False,
    Boxed -> False, Axes -> False, PlotStyle -> {Opacity[0.7]},
    PlotPoints -> 50, ViewPoint -> {2.43635, -2.09609, 1.05859},
    ViewVertical -> {0.383393, -0.107315, 1.12979}
  ],
  ImageSize -> 300
]

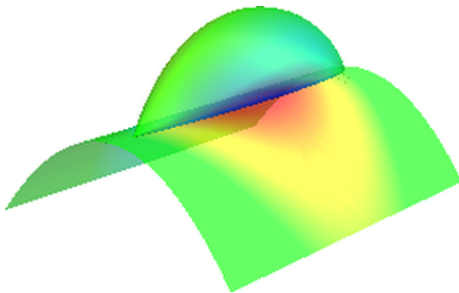
```




```

σ[s_, t_] := {s}~Join~Kink2[0.75 - s2, t];
MakeImage["4DHardware-29",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + \sigma[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False,
    PlotRange → {{-1, 1}, {-0.75, 0.75}, {-0.5, 0.75}}, Mesh → False,
    Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 200, ViewPoint → {-2.60408, -1.97812, 0.869364},
    ViewVertical → {-0.332387, -0.276651, 1.47206}
  ],
  ImageSize → 300
]

```



```

σ[s_, t_] := {s}~Join~Kink2[0, t];
MakeImage["4DHardware-30",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + \sigma[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False,
    PlotRange → {{-1, 1}, {-0.75, 0.75}, {-0.5, 0.75}}, Mesh → False,
    Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 200, ViewPoint → {-2.60408, -1.97812, 0.869364},
    ViewVertical → {-0.332387, -0.276651, 1.47206}
  ],
  ImageSize → 300
]

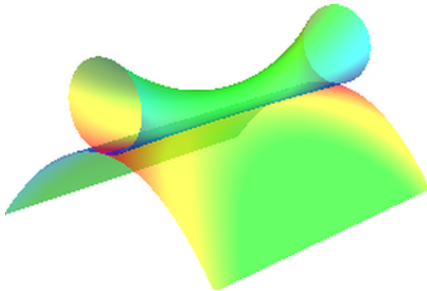
```



```

σ[s_, t_] := {s}~Join~Kink2[0.25 +  $\frac{s^2}{2}$ , t];
MakeImage["4DHardware-31",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + σ[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False,
    PlotRange → {{-1, 1}, {-0.75, 0.75}, {-0.5, 0.75}}, Mesh → False,
    Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 250, ViewPoint → {-2.60408, -1.97812, 0.869364},
    ViewVertical → {-0.332387, -0.276651, 1.47206}
  ],
  ImageSize → 300
]

```



```

σ[s_, t_] := {s}~Join~Kink2[0.8 s2 - 0.05, t];
MakeImage["4DHardware-32",
  ParametricPlot3D[σ[s, t][[1 ;; 3]],
    {s, -1, 1}, {t, -1.75, 1.75},
    ColorFunction → Function[{x, y, z, s, t}, Hue[ $\frac{2/3 + σ[s, t][[4]]}{2}$ ]],
    ColorFunctionScaling → False,
    PlotRange → {{-1, 1}, {-0.75, 0.75}, {-0.5, 0.75}}, Mesh → False,
    Boxed → False, Axes → False, PlotStyle → {Opacity[0.6]},
    PlotPoints → 250, ViewPoint → {-2.60408, -1.97812, 0.869364},
    ViewVertical → {-0.332387, -0.276651, 1.47206}
  ],
  ImageSize → 300
]

```

Join::heads : Heads List and Piecewise at positions 1 and 2 are expected to be the same. >>

Part::take : Cannot take positions 1 through 3 in

$$\text{Join}[\{-2.\}, \left\{ \begin{array}{l} \{t, -t^2, 0\} \\ \{15.75 + 5 t, -\text{Plus}[\ll 2 \gg]^2, -15.75 - 4 t\} \\ \{-1.00268 \text{ Sin}[\text{Times}[\ll 2 \gg]], 1.00268 (1 + \text{Cos}[\ll 1 \gg]), 1. t\} \\ \{-15.75 + 5 t, -\text{Plus}[\ll 2 \gg]^2, 15.75 - 4 t\} \\ \{t, -t^2, 0\} \\ 0 \end{array} \right. \left. \begin{array}{l} t < -3.9375 \\ -3.9375 \leq t < -3.15 \\ -3.15 \leq t \leq 3.15 \\ 3.15 < t \leq 3.9375 \\ t > 3.9375 \\ \text{True} \end{array} \right\} \gg$$

Join::heads : Heads List and Piecewise at positions 1 and 2 are expected to be the same. >>

Part::take : Cannot take positions 1 through 3 in

$$\text{Join}[\{-2.\}, \left\{ \begin{array}{l} \{t, -t^2, 0\} \\ \{15.75 + 5 t, -\text{Plus}[\ll 2 \gg]^2, -15.75 - 4 t\} \\ \{-1.00268 \text{ Sin}[\text{Times}[\ll 2 \gg]], 1.00268 (1 + \text{Cos}[\ll 1 \gg]), 1. t\} \\ \{-15.75 + 5 t, -\text{Plus}[\ll 2 \gg]^2, 15.75 - 4 t\} \\ \{t, -t^2, 0\} \\ 0 \end{array} \right. \left. \begin{array}{l} t < -3.9375 \\ -3.9375 \leq t < -3.15 \\ -3.15 \leq t \leq 3.15 \\ 3.15 < t \leq 3.9375 \\ t > 3.9375 \\ \text{True} \end{array} \right\} \gg$$

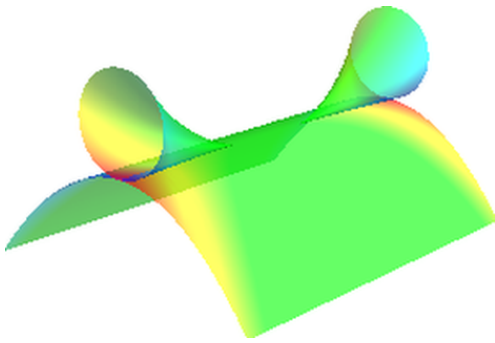
Join::heads : Heads List and Piecewise at positions 1 and 2 are expected to be the same. >>

General::stop : Further output of Join::heads will be suppressed during this calculation. >>

Part::take : Cannot take positions 1 through 3 in

$$\text{Join}[\{-2.\}, \left\{ \begin{array}{l} \{t, -t^2, 0\} \\ \{15.75 + 5 t, -\text{Plus}[\ll 2 \gg]^2, -15.75 - 4 t\} \\ \{-1.00268 \text{ Sin}[\text{Times}[\ll 2 \gg]], 1.00268 (1 + \text{Cos}[\ll 1 \gg]), 1. t\} \\ \{-15.75 + 5 t, -\text{Plus}[\ll 2 \gg]^2, 15.75 - 4 t\} \\ \{t, -t^2, 0\} \\ 0 \end{array} \right. \left. \begin{array}{l} t < -3.9375 \\ -3.9375 \leq t < -3.15 \\ -3.15 \leq t \leq 3.15 \\ 3.15 < t \leq 3.9375 \\ t > 3.9375 \\ \text{True} \end{array} \right\} \gg$$

General::stop : Further output of Part::take will be suppressed during this calculation. >>



```

MakeImage["4DHardware-33",
Show[
Graphics3D[{
Opacity[0.25], Yellow, Sphere[{0, 0, 0}, 1]
}, Boxed → False],
ParametricPlot3D[
{r Cos[θ], r Sin[θ], 0},
{r, 0, 1}, {θ, 0, 2 π},
Mesh → False, PlotStyle → {Opacity[0.75], Red}, PlotPoints → 150
],
ParametricPlot3D[
{r Cos[θ], 0, r Sin[θ]},
{r, 0, 1}, {θ, 0, 2 π},
Mesh → False, PlotStyle → {Opacity[0.75], Green}, PlotPoints → 150,
RegionFunction → Function[{x, y, z, r, θ}, 8 Abs[z] ≥ 1 - x2]
],
ParametricPlot3D[
{0, r Cos[θ], r Sin[θ]},
{r, 0, 1}, {θ, 0, 2 π},
Mesh → False, PlotStyle → {Opacity[0.75], Blue}, PlotPoints → 150,
RegionFunction → Function[{x, y, z, r, θ}, 4 Abs[z] ≥ 1 - y2 && 8 Abs[y] ≥ 1 - z2]
],
Lighting → "Neutral"
],
ImageSize → 300, ViewPoint → {1.06422, -2.02233, 2.49552},
ViewVertical → {-0.140349, 0.145661, 0.979329}]

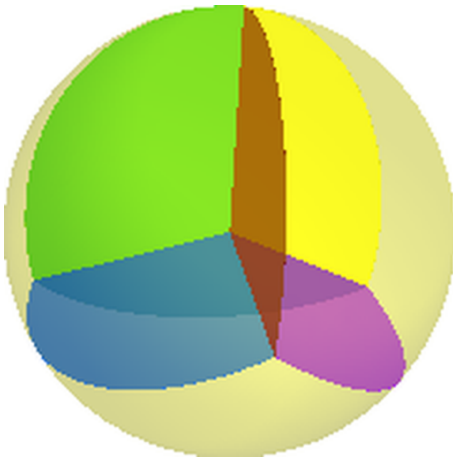
```



```

MakeImage["4DHardware-34",
  {v0, v1, v2, v3} = {{1, 1, 1}, {1, -1, -1}, {-1, 1, -1}, {-1, -1, 1}} // N;
   $\alpha = \text{ArcCos}\left[\frac{\mathbf{v0} \cdot \mathbf{v1}}{\sqrt{(\mathbf{v0} \cdot \mathbf{v0})(\mathbf{v1} \cdot \mathbf{v1})}}\right];$ 
  CircularSector[v0_, v1_] := Polygon[{{0, 0, 0}}~Join~#] & /@ Partition[
    Table[RotationMatrix[ $\theta$ , {v0, v1}].v0, { $\theta$ , 0,  $\alpha$ ,  $\alpha/36$ }],
    2, 1
  ];
  Graphics3D[{{
    Opacity[0.25], Yellow, Sphere[{0, 0, 0},  $\sqrt{3}$ ],
    Opacity[0.75], Hue[0], EdgeForm[], CircularSector[v0, v1],
    Opacity[0.75], Hue[0.15], EdgeForm[], CircularSector[v0, v2],
    Opacity[0.75], Hue[0.3], EdgeForm[], CircularSector[v0, v3],
    Opacity[0.75], Hue[0.45], EdgeForm[], CircularSector[v2, v3],
    Opacity[0.75], Hue[0.6], EdgeForm[], CircularSector[v1, v3],
    Opacity[0.75], Hue[0.75], EdgeForm[], CircularSector[v1, v2]
  }],
  Lighting -> "Neutral", Boxed -> False,
  ViewPoint -> {2.97591, -1.53334, -0.492778},
  ViewVertical -> {0.865466, 0.232794, 0.443593}
],
  ImageSize -> 300
]

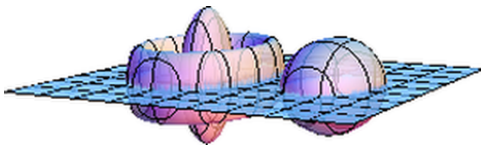
```



```

MakeImage["4DHardware-35",
  h[x_, y_] := (r = Sqrt[x^2 + y^2];
  Which[
    r <= 1, Sqrt[1 - r^2],
    2 <= r <= 3, Sqrt[(r - 2)(3 - r)],
    (x - 6)^2 + y^2 <= 4, 1/3 Sqrt[4 - (x - 6)^2 - y^2],
    True, 0
  ]);
Plot3D[{h[x, y], -h[x, y]}, {x, -5, 10}, {y, -5, 5},
  PlotRange -> All, Boxed -> False, Axes -> None,
  PlotPoints -> 250, PlotStyle -> {Opacity[0.75]}, Mesh -> 8,
  ViewPoint -> {1.54027, -2.96757, 0.520682}, ViewVertical -> {0., 0., 1.}
],
ImageSize -> 300
]

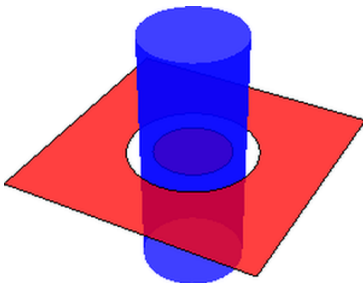
```



```

MakeImage["4DHardware-36",
  Show[{
    Graphics3D[{
      Opacity[0.75], Glow[Blue], CapForm[None],
      Tube[{{0, 0, -10}, {0, 0, 10}}, 4]
    }],
    Plot3D[0, {x, -10, 10}, {y, -10, 10},
      RegionFunction -> Function[{x, y}, x^2 + y^2 <= 3^2 || x^2 + y^2 >= 5^2],
      Mesh -> None, Axes -> None, PlotStyle -> {Opacity[0.75], Glow[Red]}
    ]
  ], Lighting -> None, Boxed -> False],
ImageSize -> 300]

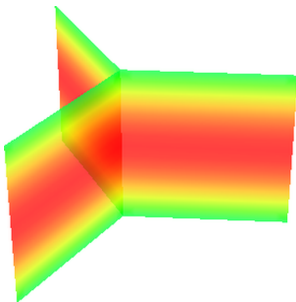
```



```

MakeImage["4DHardware-37",
  style = Sequence[
    PlotStyle → {Opacity[0.75]}, Mesh → False, ColorFunctionScaling → False,
    ColorFunction → Function[{x, y, z, t, h}, Glow[Hue[ $\frac{3}{8} - \frac{3}{8}(1 - h^2)$ ]]]]];
Show[{
  ParametricPlot3D[h {0, 0, 1} + t {1, 0, 0}, {t, 0, 2}, {h, -1, 1}, Evaluate[style]],
  ParametricPlot3D[h {0, 0, 1} + t {- $\frac{1}{2}$ ,  $\frac{\sqrt{3}}{2}$ , 0},
    {t, 0, 2}, {h, -1, 1}, Evaluate[style]],
  ParametricPlot3D[h {0, 0, 1} + t {- $\frac{1}{2}$ , - $\frac{\sqrt{3}}{2}$ , 0},
    {t, 0, 2}, {h, -1, 1}, Evaluate[style]]
},
  Lighting → None, Axes → False,
  Boxed → False, ViewPoint → {0.174611, -2.89946, 1.73569},
  ViewVertical → {0.00615481, -0.107975, 0.995608},
  PlotRange → {{-1, 2}, {- $\sqrt{3}$ , 2}, {-1, 1}},
  ImageSize → 300]

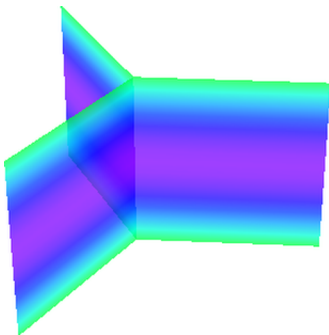
```



```

MakeImage["4DHardware-38",
  style = Sequence[
    PlotStyle → {Opacity[0.75]}, Mesh → False, ColorFunctionScaling → False,
    ColorFunction → Function[{x, y, z, t, h}, Glow[Hue[ $\frac{3}{8} + \frac{3}{8}(1 - h^2)$ ]]]]];
Show[{
  ParametricPlot3D[h {0, 0, 1} + t {1, 0, 0}, {t, 0, 2}, {h, -1, 1}, Evaluate[style]],
  ParametricPlot3D[h {0, 0, 1} + t {- $\frac{1}{2}$ ,  $\frac{\sqrt{3}}{2}$ , 0},
    {t, 0, 2}, {h, -1, 1}, Evaluate[style]],
  ParametricPlot3D[h {0, 0, 1} + t {- $\frac{1}{2}$ , - $\frac{\sqrt{3}}{2}$ , 0},
    {t, 0, 2}, {h, -1, 1}, Evaluate[style]]
},
  Lighting → None, Axes → False,
  Boxed → False, ViewPoint → {0.174611, -2.89946, 1.73569},
  ViewVertical → {0.00615481, -0.107975, 0.995608},
  PlotRange → {{-1, 2}, {- $\sqrt{3}$ , 2}, {-1, 1}},
  ImageSize → 300]

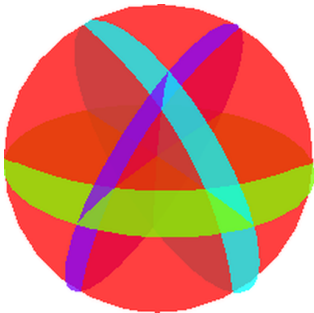
```




```

MakeImage["4DHardware-39",
  {v0, v1, v2, v3} = {{1, 1, 1}, {1, -1, -1}, {-1, 1, -1}, {-1, -1, 1}} // N;
  Cap[v_, h_] := Module[{M,  $\alpha = \pi/12$ },
    M = Orthogonalize[{v, {1, 0, 0}, {0, 1, 0}}];
    ParametricPlot3D[
      {Cos[ $\phi$ ] - Cos[ $\alpha$ ], Sin[ $\phi$ ] Cos[ $\theta$ ], Sin[ $\phi$ ] Sin[ $\theta$ ]} . M,
      { $\theta$ , 0, 2  $\pi$ }, { $\phi$ , 0,  $\alpha$ },
      PlotStyle -> {Opacity[0.75], Glow@Hue[h]}, Mesh -> None
    ]
  ];
  Show[
    Cap[v0, 0/4], Cap[v1, 1/4], Cap[v2, 2/4], Cap[v3, 3/4],
    Lighting -> None, Boxed -> False, Axes -> None,
    ViewPoint -> {1.72505, 1.99618, 2.24488},
    ViewVertical -> {-0.42126, 0.613926, 0.67101}
  ],
  ImageSize -> 300
]

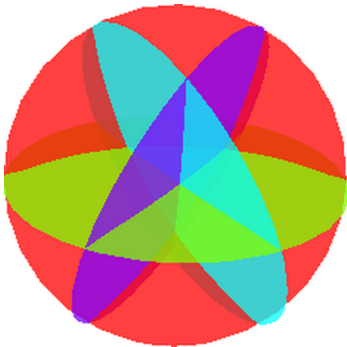
```



```

MakeImage["4DHardware-40",
  {v0, v1, v2, v3} = {{1, 1, 1}, {1, -1, -1}, {-1, 1, -1}, {-1, -1, 1}} // N;
  Cap[v_, h_] := Module[{M,  $\alpha = \pi/12$ },
    M = Orthogonalize[{v, {1, 0, 0}, {0, 1, 0}}];
    ParametricPlot3D[
      {Cos[ $\phi$ ] - Cos[ $\alpha$ ], Sin[ $\phi$ ] Cos[ $\theta$ ], Sin[ $\phi$ ] Sin[ $\theta$ ]} . M,
      { $\theta$ , 0, 2  $\pi$ }, { $\phi$ , 0,  $\alpha$ },
      PlotStyle -> {Opacity[0.75], Glow@Hue[h]}, Mesh -> None
    ]
  ];
  Show[
    Cap[-v0, 0/4], Cap[-v1, 1/4], Cap[-v2, 2/4], Cap[-v3, 3/4],
    Lighting -> None, Boxed -> False, Axes -> None,
    ViewPoint -> {1.72505, 1.99618, 2.24488},
    ViewVertical -> {-0.42126, 0.613926, 0.67101}
  ],
  ImageSize -> 300
]

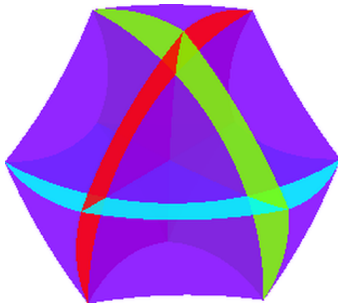
```



```

MakeImage["4DHardware-41",
  {v0, v1, v2, v3} = {{1, 1, 1}, {1, -1, -1}, {-1, 1, -1}, {-1, -1, 1}} // N;
  Cap[v_, h_] := Module[{M,  $\alpha = \pi/8$ },
    M = Orthogonalize[{v, {1, 0, 0}, {0, 1, 0}}];
    ParametricPlot3D[
      {Cos[ $\phi$ ] - Cos[ $\alpha$ ], Sin[ $\phi$ ] Cos[ $\theta$ ], Sin[ $\phi$ ] Sin[ $\theta$ ]} . M,
      { $\theta$ , 0, 2  $\pi$ }, { $\phi$ , 0,  $\alpha$ },
      PlotStyle -> {Opacity[0.85], Glow@Hue[h]}, Mesh -> None, PlotPoints -> 50
    ]
  ];
  Show[
    Cap[v0, 0/4], Cap[v1, 1/4], Cap[v2, 2/4], Cap[v3, 3/4],
    Lighting -> None, Boxed -> False,
    Axes -> None, PlotRange -> {{-1, 1}, {-1, 1}, {-1, 1}}/4,
    ViewPoint -> {-2.10548, -1.77719, 2.09966},
    ViewVertical -> {0.296139, -0.653224, 0.69685}
  ],
  ImageSize -> 300
]

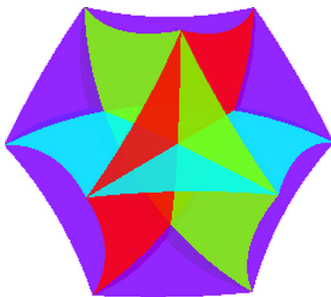
```



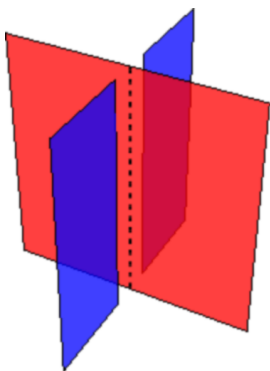
```

MakeImage["4DHardware-42",
  {v0, v1, v2, v3} = {{1, 1, 1}, {1, -1, -1}, {-1, 1, -1}, {-1, -1, 1}} // N;
  Cap[v_, h_] := Module[{M,  $\alpha = \pi/8$ },
    M = Orthogonalize[{v, {1, 0, 0}, {0, 1, 0}}];
    ParametricPlot3D[
      {Cos[ $\phi$ ] - Cos[ $\alpha$ ], Sin[ $\phi$ ] Cos[ $\theta$ ], Sin[ $\phi$ ] Sin[ $\theta$ ]} . M,
      { $\theta$ , 0, 2  $\pi$ }, { $\phi$ , 0,  $\alpha$ },
      PlotStyle -> {Opacity[0.85], Glow@Hue[h]}, Mesh -> None, PlotPoints -> 50
    ]
  ];
  Show[
    Cap[-v0, 0/4], Cap[-v1, 1/4], Cap[-v2, 2/4], Cap[-v3, 3/4],
    Lighting -> None, Boxed -> False,
    Axes -> None, PlotRange -> {{-1, 1}, {-1, 1}, {-1, 1}}/4,
    ViewPoint -> {-2.10548, -1.77719, 2.09966},
    ViewVertical -> {0.296139, -0.653224, 0.69685}
  ],
  ImageSize -> 300
]

```



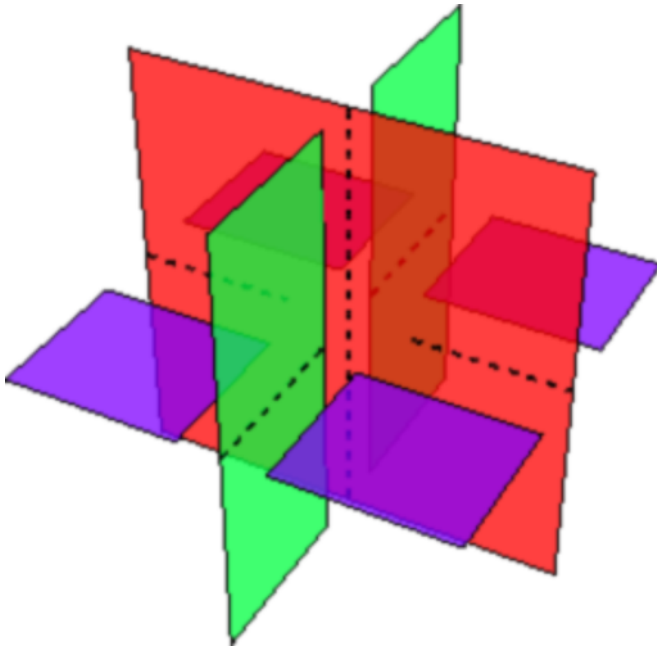
```
MakeImage["4DHardware-43",  
Graphics3D[{  
  Opacity[0.75], Dashed, Thick,  
  Glow[Red], Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],  
  Glow[Blue],  
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, -2, 10}, {0, -2, -10}}],  
  Polygon[{{0, 10, -10}, {0, 10, 10}, {0, 2, 10}, {0, 2, -10}}],  
  Line[{{0, 0, -10}, {0, 0, 10}}]  
}, Lighting -> None, Boxed -> False],  
ImageSize -> 300]
```



```

MakeImage["4DHardware-44",
Graphics3D[{
  Opacity[0.75], Dashed, Thick,
  Glow[Hue[0]], Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
  Glow[Hue[3/8]],
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, -2, 10}, {0, -2, -10}}],
  Polygon[{{0, 10, -10}, {0, 10, 10}, {0, 2, 10}, {0, 2, -10}}],
  Line[{{0, 0, -10}, {0, 0, 10}}],
  Glow[Hue[3/4]],
  Polygon[{{2, 10, 0}, {2, 3, 0}, {10, 3, 0}, {10, 10, 0}}],
  Polygon[{{-2, 10, 0}, {-2, 3, 0}, {-10, 3, 0}, {-10, 10, 0}}],
  Polygon[{{-2, -10, 0}, {-2, -3, 0}, {-10, -3, 0}, {-10, -10, 0}}],
  Polygon[{{2, -10, 0}, {2, -3, 0}, {10, -3, 0}, {10, -10, 0}}],
  Line[{{-10, 0, 0}, {-3, 0, 0}}], Line[{{3, 0, 0}, {10, 0, 0}}],
  Line[{{0, -10, 0}, {0, -2, 0}}], Line[{{0, 2, 0}, {0, 10, 0}}]
}, Lighting -> None, Boxed -> False],
ImageSize -> 300]

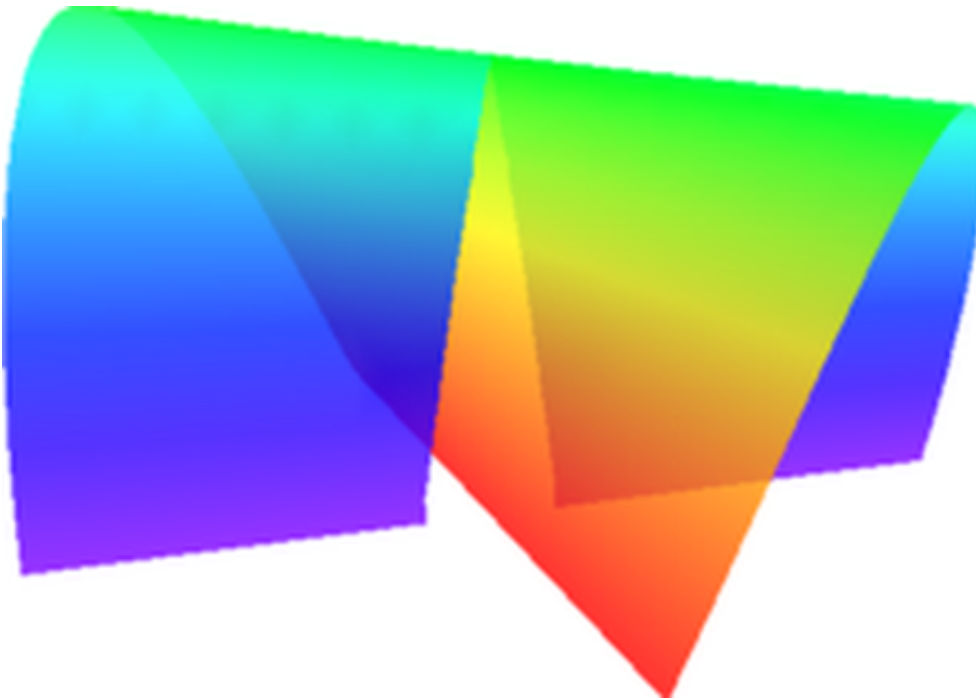
```



```

MakeImage["4DHardware-45",
  ParametricPlot3D[
    {t Cos[α], t Sin[α], Sin[2 α]},
    {α, 0, π/2}, {t, -1, 1},
    ColorFunction → Function[{x, y, z, α, t}, Glow[Hue[ $\frac{3\alpha}{2\pi}$ ]]],
    RegionFunction → Function[{x, y, z, α, t}, α < π/4 ∨ Abs[t] > 0.15 (1 - Sin[2 α])],
    ColorFunctionScaling → False,
    Lighting → None, Boxed → False, Axes → None, Mesh → False,
    PlotStyle → Opacity[0.8],
    ViewPoint → {3.04409, -1.04426, 1.02454},
    ViewVertical → {0.656036, -0.224113, 1.44137}
  ],
  ImageSize → 300]

```



```
MakeImage["4DHardware-46",  
  ParametricPlot3D[  
    {t Cos[α], t Sin[α], Sin[2 α]},  
    {α, 0, π/2}, {t, -1, 1},  
    RegionFunction → Function[{x, y, z, α, t}, α < π/4 ∨ Abs[t] > 0.15 (1 - Sin[2 α])],  
    Boxed → False, Axes → None, Mesh → False,  
    PlotStyle → Directive[Red, Opacity[0.8]],  
    ViewPoint → {3.04409, -1.04426, 1.02454},  
    ViewVertical → {0.656036, -0.224113, 1.44137}  
  ],  
  ImageSize → 300]
```




```

MakeImage["4DHardware-47", Graphics3D[{
  Opacity[0.85],
  Glow[Red], Polygon[{{-10, 0, -10}, {-10, 0, 10}, {10, 0, 10}, {10, 0, -10}}],
  Glow[Green],
  Polygon[{{0, -10, -10}, {0, -10, 10}, {0, -1, 10}, {0, -1, -10}}],
  Polygon[{{0, 10, -10}, {0, 10, 10}, {0, 1, 10}, {0, 1, -10}}],
  Opacity[1], Blue,
  Arrow[{{-6, 8, 0}, {6, 8, 0}}], Arrow[{{-6, -8, 0}, {6, -8, 0}}],
  Arrow[{{8, -6, 0}, {8, 6, 0}}], Arrow[{{-8, -6, 0}, {-8, 6, 0}}]
  , Black,
  Text[Style[x, 16], {3, 9, 1}], Text[Style[y, 16], {4, -6.5, 1}],
  Text[Style[z, 16], {7, -4, 1}], Text[Style[z, 16], {-6.5, -4, 1}]
}, Lighting -> None, Boxed -> False,
ViewPoint -> {0.90007, -1.05231, 3.08748},
ViewVertical -> {-0.232159, 0.442406, 0.866244}
], ImageSize -> 300]

```

