An de grâce 2017, mercredi 12 juillet 9h:03

**Grille yin yang**

https://groups.google.com/forum/#!topic/sage-support/NswQgDClEoA (https://groups.google.com/forum/#!topic/sage-support/NswQgDClEoA) (Nils bruin)

Affichage latex et déclaration des variables, renommage :

In [2]:
```
%display latex
#var("r,theta,phi")
var("r t p")
```

Out[2]:

Définition de la fonction coordonnée : Je vais la renommer en plus général, de façon à m'en souvenir.

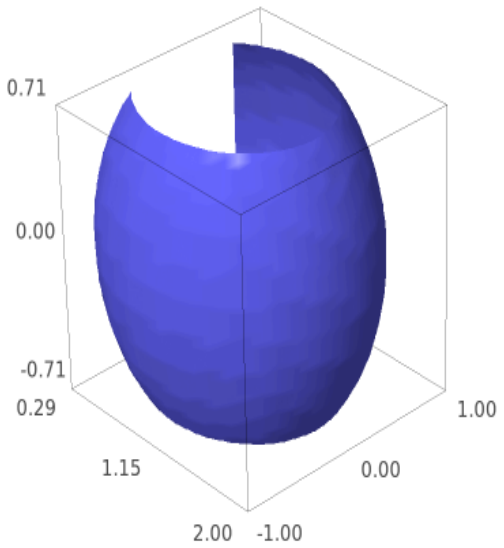
$r=r$ , $\theta = t$ , $\phi=p$ , switch=$u$ , shift =$s$

In [4]:
```
def coordfunc(r,t,p,u,s=0):
    if u=="yin":
        return (r*sin(t)*cos(p)+s,
                r*sin(t)*sin(p),r*cos(t))
    else:
        return (-r*sin(t)*cos(p)+s,
                r*cos(t),r*sin(t)*sin(p))
```

Traçage de la partie yin (horizontale), première couche, bleu si pas d'indication autre.

In [5]:
```
yin=(parametric_plot3d(coordfunc(1,theta,phi,"yin",1),
                       (theta,pi/4,3*pi/4),
                       (phi,-3*pi/4,3*pi/4)))
yin
```

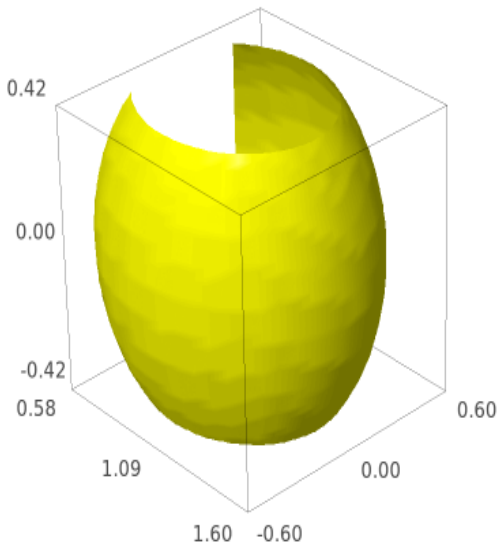
Out[5]:




Traçage du deuxième module, à l'intérieur

In [6]:
```
yin2=parametric_plot3d(coordfunc(0.6,theta,phi,"yin",1),
                       (theta,pi/4,3*pi/4),
                       (phi,-3*pi/4,3*pi/4),
                       color="yellow")
yin2
```

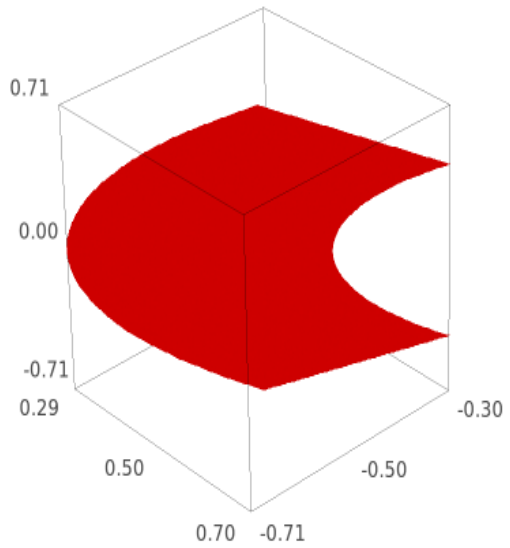
Out[6]:




Traçage de yin3,bordure épaisse

In [8]:
```
yin3=parametric_plot3d(coordfunc(r,theta,-3*pi/4,"yin",1),
                           (r,0.6,1),
                         (theta,pi/4,3*pi/4),color="red")
yin3
```

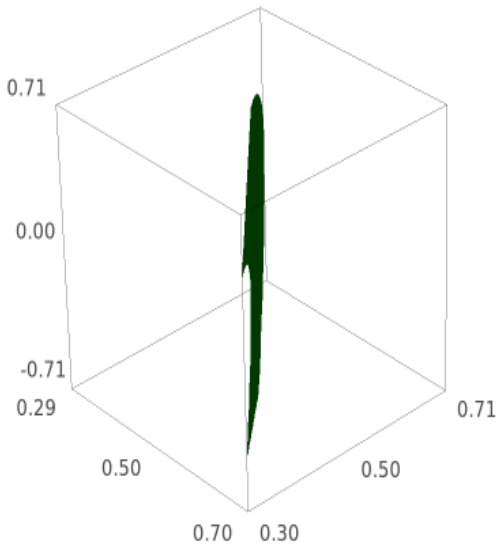
Out[8]:




Yin4 pendant positif de yin3

In [9]:
```
yin4=parametric_plot3d(coordfunc(r,theta,3*pi/4,"yin",1),
                           (r,0.6,1),(theta,pi/4,3*pi/4),
                       color="green")
yin4
```

Out[9]:

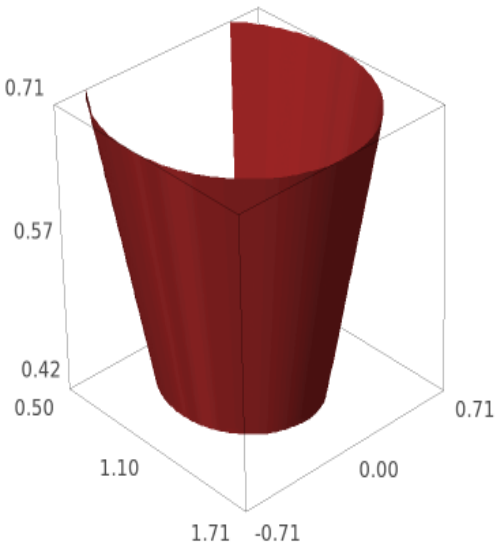



Application loaded.

Yin5, cone à l'intérieur

In [11]:
```
yin5=parametric_plot3d(coordfunc(r,pi/4,phi,"yin",1),
                   (r,0.6,1),(phi,-3*pi/4,3*pi/4),
                        color="brown")
yin5
```

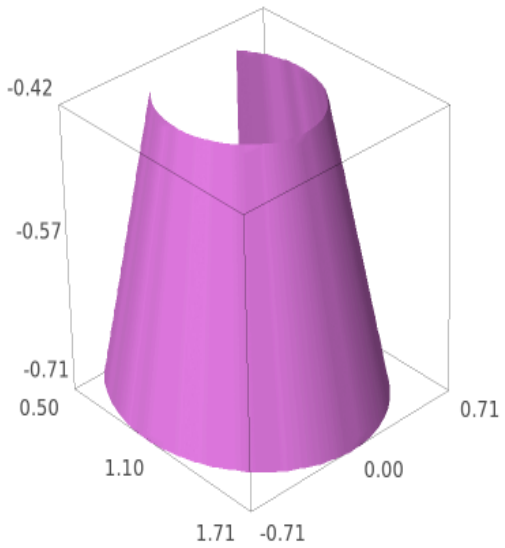
Out[11]:




Yin6

In [12]:
```
yin6=parametric_plot3d(coordfunc(r,3*pi/4,phi,"yin",1),
                           (r,0.6,1),
                  (phi,-3*pi/4,3*pi/4),color="violet")
yin6
```

Out[12]:

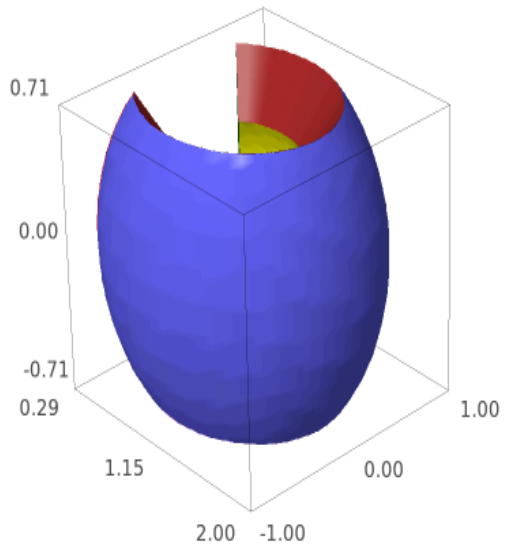



Application loaded.

Assemblage des 6 formes (trigrammes), SAGE ajoute les modules, ce qui en fait une amélioration par rapport à mathematica, beaucoup plus compliqué. Un peu de fioriture et l'emballage sera plus beau : L'élève dépasse le maître (sage>mathematica).

In [43]:
```
a=(yin+yin2+yin3+yin4+yin5+yin6);a
```

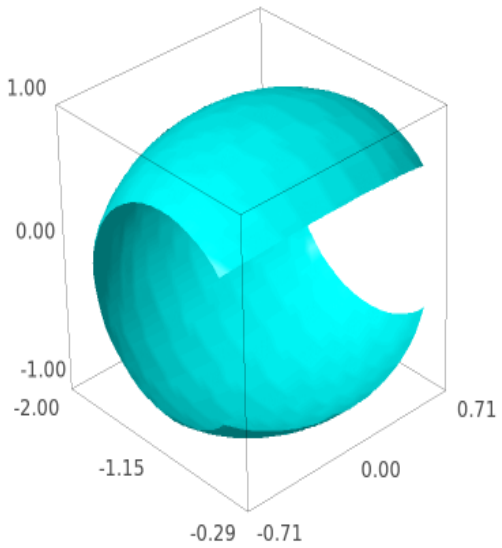
Out[43]:




Maintenant tracer la partie yiang (verticale)

In [19]:
```
yang=(parametric_plot3d(coordfunc(1,theta,phi,"yang",-1),
                        (theta,pi/4,3*pi/4),
                        (phi,-3*pi/4,3*pi/4),color="cyan"))
yang
```

Out[19]:



In [20]:
```
yang2=parametric_plot3d(coordfunc(0.6,theta,phi,"yang",-1),
                    (theta,pi/4,3*pi/4),(phi,-3*pi/4,3*pi/4),
                    color="salmon")
yang2
```

Out[20]:

In [25]:
```
yang3=parametric_plot3d(coordfunc(r,theta,-3*pi/4,"yang",-1),
                        (r,0.6,1),
                        (theta,pi/4,3*pi/4),color="purple")
yang3
```

Out[25]:

In [37]:
```
yang4=parametric_plot3d(coordfunc(r,theta,3*pi/4,"yang",-1),
                        (r,0.6,1),
                        (theta,pi/4,3*pi/4),
                        color="olive")
yang4
```

Out[37]:

In [38]:
```
yang5=parametric_plot3d(coordfunc(r,pi/4,phi,"yang",-1),
                        (r,0.6,1),
                        (phi,-3*pi/4,3*pi/4),
                       color="chartreuse")
yang5
```

Out[38]:

In [40]:
```
yang6=parametric_plot3d(coordfunc(r,3*pi/4,phi,"yang",-1),
                        (r,0.6,1),
                           (phi,-3*pi/4,3*pi/4),
                          color="misty rose")
yang6
```

Out[40]:

In [44]:
```
b=(yang+yang2+yang3+yang4+yang5+yang6);b
```

Out[44]:

Application loaded.

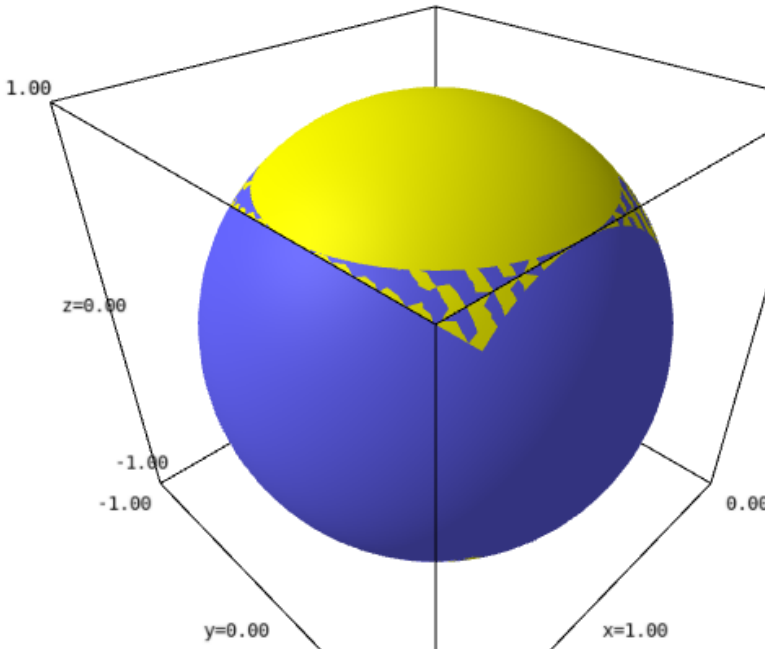
In [47]:
```
#sorted(colors)
```

In [48]:
```
show(a+b,aspect_ratio=1)
```

Application loaded.

In [50]:
```
var("r,theta,phi");
def coordfunc(r,theta,phi,switch,shift=0):
    if switch=="yin":
        return (r*sin(theta)*cos(phi)+shift,
                r*sin(theta)*sin(phi),r*cos(theta))
    else:
        return (-r*sin(theta)*cos(phi)+shift,
                r*cos(theta),r*sin(theta)*sin(phi))
yin=(parametric_plot3d(coordfunc(1,theta,phi,"yin",1),
                       (theta,pi/4,3*pi/4),
                       (phi,-3*pi/4,3*pi/4))+
#yin2
     parametric_plot3d(coordfunc(0.6,theta,phi,"yin",1),
                       (theta,pi/4,3*pi/4),
                       (phi,-3*pi/4,3*pi/4),color="yellow")+
#yin3
        parametric_plot3d(coordfunc(r,theta,-3*pi/4,"yin",1),
                          (r,0.6,1),(theta,pi/4,3*pi/4))+
#yin4
        parametric_plot3d(coordfunc(r,theta,3*pi/4,"yin",1),
                          (r,0.6,1),(theta,pi/4,3*pi/4))+
#yin5
     parametric_plot3d(coordfunc(r,pi/4,phi,"yin",1),(r,0.6,1),
                       (phi,-3*pi/4,3*pi/4))+
#yin6
        parametric_plot3d(coordfunc(r,3*pi/4,phi,"yin",1),
                          (r,0.6,1),(phi,-3*pi/4,3*pi/4)))

yang=(parametric_plot3d(coordfunc(1,theta,phi,"yang",1),
                        (theta,pi/4,3*pi/4),
                        (phi,-3*pi/4,3*pi/4),color="yellow")+
#yang2
      parametric_plot3d(coordfunc(0.6,theta,phi,"yang",1),
                     (theta,pi/4,3*pi/4),(phi,-3*pi/4,3*pi/4),
                     color="yellow")+
#yang3
      parametric_plot3d(coordfunc(r,theta,-3*pi/4,"yang",1),
                        (r,0.6,1),(theta,pi/4,3*pi/4))+
#yang4
      parametric_plot3d(coordfunc(r,theta,3*pi/4,"yang",1),
                        (r,0.6,1),(theta,pi/4,3*pi/4))+
#yang5
      parametric_plot3d(coordfunc(r,pi/4,phi,"yang",1),
                        (r,0.6,1),(phi,-3*pi/4,3*pi/4))+
#yang6
   parametric_plot3d(coordfunc(r,3*pi/4,phi,"yang",1),
                     (r,0.6,1),(phi,-3*pi/4,3*pi/4)))
#yangyin
(yin+yang).show(viewer="threejs")
```




Le graphique montre bien l'inclusion horizontal et vertical du yin / yang. Ce qui n'apparait pas au premier abord dans un graphique 2D

In [ ]: