Modeling of Orbitsphere Modulation Functions

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```
<< Calculus`VectorAnalysis`
<< Graphics`ParametricPlot3D`
<< Graphics`Shapes`
<< Graphics`Animation`
<< Graphics`SurfaceOfRevolution`
```

This is a computational appendix to the Angular Functions section of Chapter 1 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2004 Edition, posted at: http://www.blacklightpower.com/bookdownload.shtml.

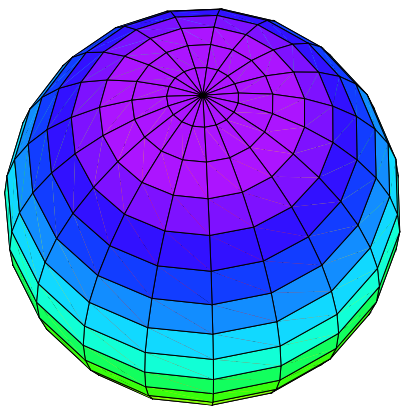
The orbital function modulates the constant (spin) function and propagates as a charge-density wave on the spherical surface.

■ L1MO

```
L1MOcolors[theta_, phi_, det_] =
  Which[det < 0.1333, RGBColor[1.000, 0.070, 0.079], det < .2666,
   RGBColor[1.000, 0.369, 0.067], det < .4, RGBColor[1.000, 0.681, 0.049], det < .5333,
   RGBColor[0.984, 1.000, 0.051], det < .6666, RGBColor[0.673, 1.000, 0.058], det < .8,
   RGBColor[0.364, 1.000, 0.055], det < .9333, RGBColor[0.071, 1.000, 0.060], det < 1.066,
   RGBColor[0.085, 1.000, 0.388], det < 1.2, RGBColor[0.070, 1.000, 0.678], det < 1.333,
   RGBColor[0.070, 1.000, 1.000], det < 1.466, RGBColor[0.067, 0.698, 1.000], det < 1.6,
   RGBColor[0.075, 0.401, 1.000], det < 1.733, RGBColor[0.067, 0.082, 1.000],
   det < 1.866, RGBColor[0.326, 0.056, 1.000], det ≤ 2, RGBColor[0.674, 0.079, 1.000]];
```

Note that this distribution is symmetric about ϕ, thus the distribution is not time-dependent.

```
L1MO = ParametricPlot3D[{Sin[theta] Cos[phi],
    Sin[theta] Sin[phi], Cos[theta], L1MOcolors[theta, phi, 1 + Cos[theta]]},
   {theta, 0, Pi}, {phi, 0, 2 Pi}, Boxed → False, Axes → False, Lighting → False,
   PlotPoints → {20, 20}, ViewPoint → {-0.273, -2.030, 3.494}];
```



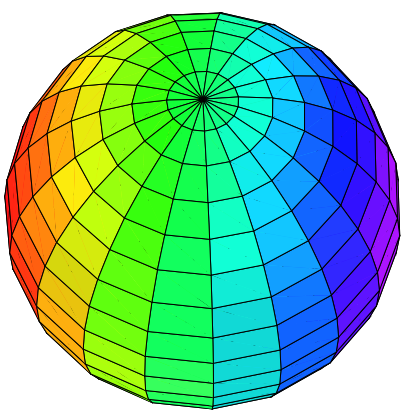
■ L1MX (Animated)

```
L1MXcolors[theta_, phi_, det_] =
    Which[det < 0.1333, RGBColor[1.000, 0.070, 0.079],
    det < .2666, RGBColor[1.000, 0.369, 0.067],
    det < .4, RGBColor[1.000, 0.681, 0.049],
    det < .5333, RGBColor[0.984, 1.000, 0.051],
    det < .6666, RGBColor[0.673, 1.000, 0.058],
    det < .8, RGBColor[0.364, 1.000, 0.055],
    det < .9333, RGBColor[0.071, 1.000, 0.060],
    det < 1.066, RGBColor[0.085, 1.000, 0.388],
    det < 1.2, RGBColor[0.070, 1.000, 0.678],
    det < 1.333, RGBColor[0.070, 1.000, 1.000],
    det < 1.466, RGBColor[0.067, 0.698, 1.000],
    det < 1.6, RGBColor[0.075, 0.401, 1.000],
    det < 1.733, RGBColor[0.067, 0.082, 1.000],
    det < 1.866, RGBColor[0.326, 0.056, 1.000],
    det <= 2, RGBColor[0.674, 0.079, 1.000]];

Clear[L1MX];

Array[L1MX, {30}];
```

```
Do[
  L1MX[i] = ParametricPlot3D[{Sin[theta] Cos[phi], Sin[theta] Sin[phi], Cos[theta],
     L1MXcolors[theta, phi + (2 π/30 i), 1 + Sin[theta] Cos[phi + (2 π/30 i)]]},
    {theta, 0, Pi}, {phi, 0, 2 Pi}, Boxed → False, Axes → False, Lighting → False,
    PlotPoints → {20, 20}, ViewPoint → {-0.273, -2.030, 3.494}],
  {i,
   1,
   30}];
```



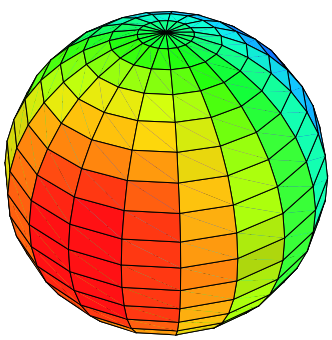
Click **GIF** or **AVI** to see it animate.

■ L1MY

```
L1MYcolors[theta_, phi_, det_] =
  Which[det < 0.1333, RGBColor[1.000, 0.070, 0.079], det < .2666,
   RGBColor[1.000, 0.369, 0.067], det < .4, RGBColor[1.000, 0.681, 0.049], det < .5333,
   RGBColor[0.984, 1.000, 0.051], det < .6666, RGBColor[0.673, 1.000, 0.058], det < .8,
   RGBColor[0.364, 1.000, 0.055], det < .9333, RGBColor[0.071, 1.000, 0.060], det < 1.066,
   RGBColor[0.085, 1.000, 0.388], det < 1.2, RGBColor[0.070, 1.000, 0.678], det < 1.333,
   RGBColor[0.070, 1.000, 1.000], det < 1.466, RGBColor[0.067, 0.698, 1.000], det < 1.6,
   RGBColor[0.075, 0.401, 1.000], det < 1.733, RGBColor[0.067, 0.082, 1.000],
   det < 1.866, RGBColor[0.326, 0.056, 1.000], det ≤ 2, RGBColor[0.674, 0.079, 1.000]];
```

Note that this will look identical to the L1MX case, when spinning

```
L1MY = ParametricPlot3D[{Sin[theta] Cos[phi], Sin[theta] Sin[phi], Cos[theta],
    L1MYcolors[theta, phi, 1 + Sin[theta] Sin[phi]]}, {theta, 0, Pi}, {phi, 0, 2 Pi},
  Boxed → False, Axes → False, Lighting → False, PlotPoints → {20, 20}];
```

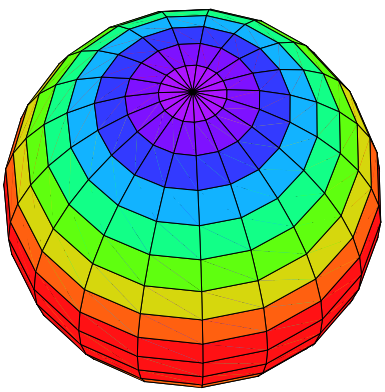


■ L2MO

```
L2MOcolors[theta_, phi_, det_] =
    Which[det < 0.2, RGBColor[1.000, 0.070, 0.079],
    det < .4, RGBColor[1.000, 0.369, 0.067],
    det < .6, RGBColor[1.000, 0.681, 0.049],
    det < .8, RGBColor[0.984, 1.000, 0.051],
    det < 1, RGBColor[0.673, 1.000, 0.058],
    det < 1.2, RGBColor[0.364, 1.000, 0.055],
    det < 1.4, RGBColor[0.071, 1.000, 0.060],
    det < 1.6, RGBColor[0.085, 1.000, 0.388],
    det < 1.8, RGBColor[0.070, 1.000, 0.678],
    det < 2, RGBColor[0.070, 1.000, 1.000],
    det < 2.2, RGBColor[0.067, 0.698, 1.000],
    det < 2.4, RGBColor[0.075, 0.401, 1.000],
    det < 2.6, RGBColor[0.067, 0.082, 1.000],
    det < 2.8, RGBColor[0.326, 0.056, 1.000],
    det <= 3, RGBColor[0.674, 0.079, 1.000]];
```

Note that this distribution is symmetric about ϕ, thus the distribution is not time-dependent.

```
L2MO=ParametricPlot3D[{Sin[theta] Cos[phi], Sin[theta] Sin[phi], Cos[theta],
    L2MOcolors[theta, phi, 3Cos[theta] Cos[theta]]},
    {theta, 0, Pi}, {phi, 0, 2Pi},
    Boxed -> False, Axes -> False, Lighting -> False,
    PlotPoints-> {20, 20},
    ViewPoint->{-0.273, -2.030, 3.494}];
```

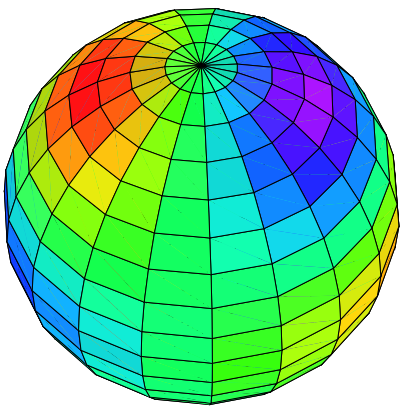


■ L2MF (Animated)

```
L2MFcolors[theta_, phi_, det_] =
  Which[det < 0.1333, RGBColor[1.000, 0.070, 0.079], det < .2666,
   RGBColor[1.000, 0.369, 0.067], det < .4, RGBColor[1.000, 0.681, 0.049], det < .5333,
   RGBColor[0.984, 1.000, 0.051], det < .6666, RGBColor[0.673, 1.000, 0.058], det < .8,
   RGBColor[0.364, 1.000, 0.055], det < .9333, RGBColor[0.071, 1.000, 0.060], det < 1.066,
   RGBColor[0.085, 1.000, 0.388], det < 1.2, RGBColor[0.070, 1.000, 0.678], det < 1.333,
   RGBColor[0.070, 1.000, 1.000], det < 1.466, RGBColor[0.067, 0.698, 1.000], det < 1.6,
   RGBColor[0.075, 0.401, 1.000], det < 1.733, RGBColor[0.067, 0.082, 1.000],
   det < 1.866, RGBColor[0.326, 0.056, 1.000], det ≤ 2, RGBColor[0.674, 0.079, 1.000]];

Array[L2MF, {30}];

Do[
  L2MF[i] = ParametricPlot3D[{Sin[theta] Cos[phi], Sin[theta] Sin[phi], Cos[theta],
     L2MFcolors[theta, phi + (2 π/30 i), 1 + .72618 Sin[theta] Cos[phi + (2 π/30 i)]
       5 Cos[theta] Cos[theta] - .72618 Sin[theta] Cos[phi + (2 π/30 i)]]},
    {theta, 0, Pi}, {phi, 0, 2 Pi}, Boxed → False, Axes → False, Lighting → False,
    PlotPoints → {20, 20}, ViewPoint → {-0.273, -2.030, 2.494}],
  {i,
   1,
   30}];
```



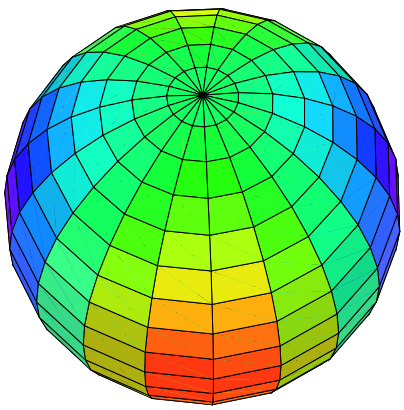
Click **GIF** or **AVI** to see it animate.

■ L2MX2Y2 (Animation)

```
L2MX2Y2colors[theta_, phi_, det_] =
  Which[det < 0.1333, RGBColor[1.000, 0.070, 0.079], det < .2666,
   RGBColor[1.000, 0.369, 0.067], det < .4, RGBColor[1.000, 0.681, 0.049], det < .5333,
   RGBColor[0.984, 1.000, 0.051], det < .6666, RGBColor[0.673, 1.000, 0.058], det < .8,
   RGBColor[0.364, 1.000, 0.055], det < .9333, RGBColor[0.071, 1.000, 0.060], det < 1.066,
   RGBColor[0.085, 1.000, 0.388], det < 1.2, RGBColor[0.070, 1.000, 0.678], det < 1.333,
   RGBColor[0.070, 1.000, 1.000], det < 1.466, RGBColor[0.067, 0.698, 1.000], det < 1.6,
   RGBColor[0.075, 0.401, 1.000], det < 1.733, RGBColor[0.067, 0.082, 1.000],
   det < 1.866, RGBColor[0.326, 0.056, 1.000], det ≤ 2, RGBColor[0.674, 0.079, 1.000]];

Array[L2MX2Y2, {30}];

Do[L2MX2Y2[i] = ParametricPlot3D[{Sin[theta] Cos[phi], Sin[theta] Sin[phi], Cos[theta],
      L2MX2Y2colors[theta, phi + (2 π / 30 i), 1 + Sin[theta] Sin[theta] Cos[2 phi + (2 π / 30 i)]]},
    {theta, 0, Pi}, {phi, 0, 2 Pi}, Boxed → False, Axes → False, Lighting → False,
    PlotPoints → {20, 20}, ViewPoint → {-0.273, -2.030, 3.494}],
  {i,
   1,
   30}];
```



Click **GIF** or **AVI** to see it animate.

■ L2MXY

```
L2MXYcolors[theta_, phi_, det_] =
  Which[det < 0.1333, RGBColor[1.000, 0.070, 0.079], det < .2666,
   RGBColor[1.000, 0.369, 0.067], det < .4, RGBColor[1.000, 0.681, 0.049], det < .5333,
   RGBColor[0.984, 1.000, 0.051], det < .6666, RGBColor[0.673, 1.000, 0.058], det < .8,
   RGBColor[0.364, 1.000, 0.055], det < .9333, RGBColor[0.071, 1.000, 0.060], det < 1.066,
   RGBColor[0.085, 1.000, 0.388], det < 1.2, RGBColor[0.070, 1.000, 0.678], det < 1.333,
   RGBColor[0.070, 1.000, 1.000], det < 1.466, RGBColor[0.067, 0.698, 1.000], det < 1.6,
   RGBColor[0.075, 0.401, 1.000], det < 1.733, RGBColor[0.067, 0.082, 1.000],
   det < 1.866, RGBColor[0.326, 0.056, 1.000], det ≤ 2, RGBColor[0.674, 0.079, 1.000]];
```

Note that when spinning this is identical to L2MX2Y2

```
ParametricPlot3D[{Sin[theta] Cos[phi], Sin[theta] Sin[phi],
   Cos[theta], L2MXYcolors[theta, phi, 1 + Sin[theta] Sin[theta] Sin[2 phi]]},
  {theta, 0, Pi}, {phi, 0, 2 Pi}, Boxed → False, Axes → False, Lighting → False,
  PlotPoints → {20, 20}, ViewPoint → {-0.273, -2.030, 3.494}];
```