

```

In[29]:= (*Interactive Hollow Sphere with Cutaway View, Charge Distribution,
External Electric Field, and Legendre Polynomial*)
Manipulate[Graphics3D[(*Outer Surface with Cutaway View*) {ClipPlanes → {{-1, 1, 0, 0}},
  Opacity[0.4], Specularity[White, 10], Yellow, Ball[{0, 0, 0}, a]}, (*Inner Surface*)
{Opacity[1], Black, Ball[{0, 0, 0}, b]}], (*Electric Field Arrows*) {Red,
  Arrowheads[0.02], Table[Arrow[{{x, y, -5}, {x, y, 5}}], {x, -5, 5, 2}, {y, -5, 5, 2}}],
(*Charge Distribution on Outer Surface*)
{Blue, Table[Text["+", {a Cos[theta] Sin[phi], a Sin[theta] Sin[phi], a Cos[phi]}],
  {theta, 0, 2 Pi, Pi / 8}, {phi, 0, Pi, Pi / 8}}], (*Legendre Polynomial Mapping*)
{Green, ParametricPlot3D[(a + (1 / 2) * (3 * (z / a) ^ 2 - 1)) Cos[theta] Sin[phi],
  (a + (1 / 2) * (3 * (z / a) ^ 2 - 1)) Sin[theta] Sin[phi], (a + (1 / 2) * (3 * (z / a) ^ 2 - 1))
  Cos[phi]], {theta, 0, 2 Pi}, {phi, 0, Pi}, Mesh → None][[1]]},
  Axes → True, AxesLabel → {"x", "y", "z"}, Lighting → "Neutral", Boxed → False],
{{a, 3, "Outer Radius"}, 2, 5}, {{b, 1, "Inner Radius"}, 1, a}]

```

Out[29]=

