In[ ]:=

```
Charting`$InteractiveHighlighting = False
```

Out[ ]=

```
False
```

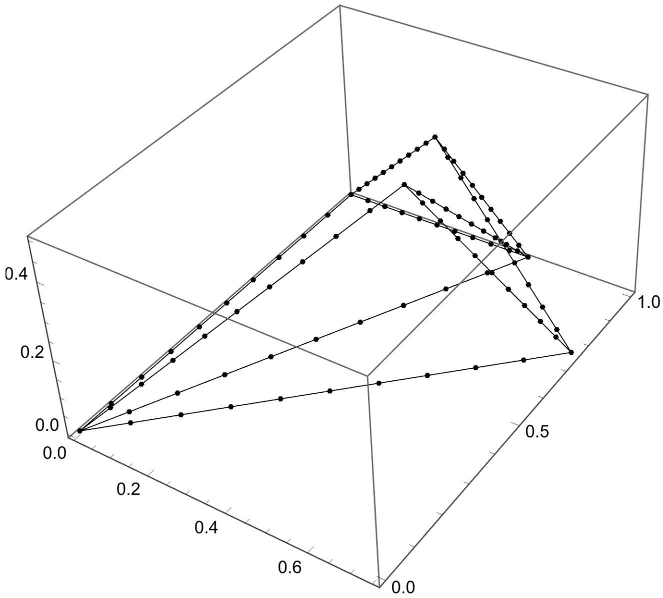
In[ ]:=

```
n = 10; (* Points to sample along each connection *)
path = N@With[{Γ = {0, 0, 0}, X = {0, 1, 0}, W = {1/2, 1, 0}, L = {1/2, 1/2, 1/2},
     kPts = {3/4, 3/4, 0}, U = {1/4, 1, 1/4}}, {L, kPts, U, W, Γ, X, W, L, Γ, kPts, U, X}];
(* The list of high-symmetry points *)
kPts = Subdivide[#1, #2, n] & @@@ Partition[path, 2, 1] // Flatten[#, 1] & //
   DeleteAdjacentDuplicates;(* List of n points sampled along
  each line of the path going through the high-symmetry points,
it's literally the points generated by traversing the line,
although not in equal steps *)
Length@kPts (* Total count of the sampling points *)
Graphics3D[{Point[#] & /@ kPts, Line[path]}, Axes → True]
```

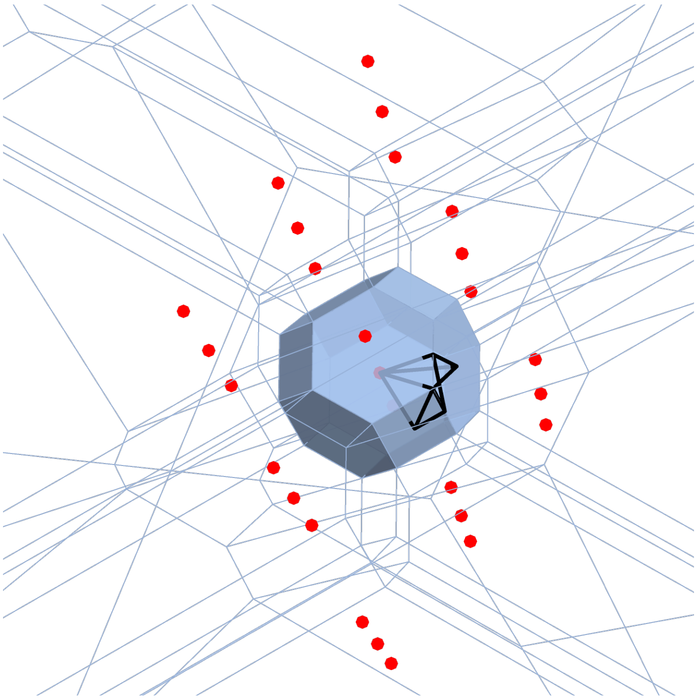
Out[ ]=

```
111
```

Out[ ]=



```
In[∘]:= basis = N@{{1, -1, 1}, {1, 1, -1}, {-1, 1, 1}}; (* The basis for the G *)
        G = Tuples[Range[-2, 2], 3].basis // Take[#, Length@kPts] &;
        (* All possible combinations that give the G points *)
        Length@G (* Number of sampled points *)
        (* 1BZ represented for a bcc lattice *)
        With[{G = Tuples[Range[-1, 1], 3].basis},
         Show[VoronoiMesh[G, PlotTheme → "Lines",
            MeshCellStyle → {{3, "Interior"} → Directive[Opacity[0.8]]}],
          Graphics3D[{{AbsolutePointSize[7], Red, Point[G]}, {Thick, Line[path]}}],
          PlotRange → Automatic]]
Out[∘]=
        111
Out[∘]=
```



```
In[∘]:= allCombs = Tuples[{kPts, G, G}] // Partition[#, Length@G] &;

In[∘]:= << Notation`

In[∘]:= Notation[ x_n_ ⟺ x_⟦n_⟧ ]
```

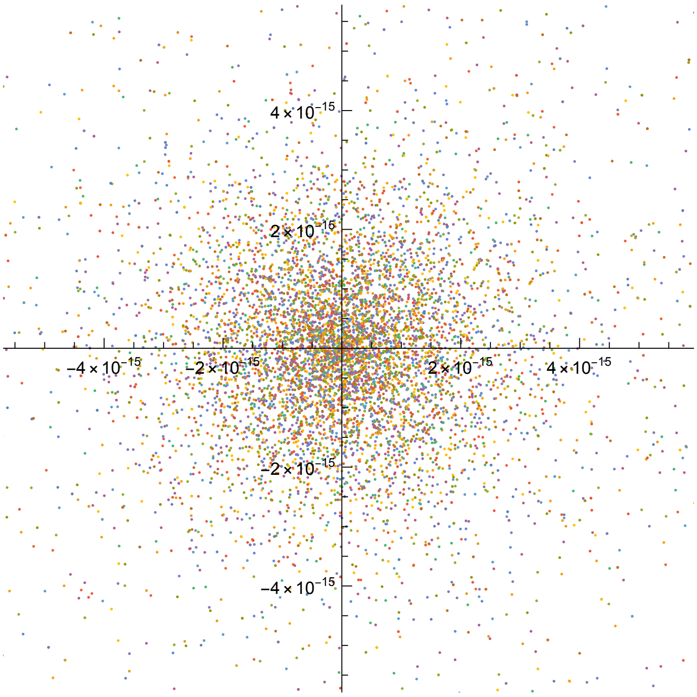
In[∘]:= $$d = N@\left\{\{0, 0, 0\}, \left\{\frac{1}{4}, \frac{1}{4}, \frac{1}{4}\right\}\right\};$$

In[∘]:= $$M = \left(\frac{1}{2}\,\text{Norm}[\#1 + \#2]^2 + \sum_{\nu=1}^{2} \text{Exp}[-\text{I}\,\text{Dot}[\#2 - \#3, d_\nu]]\right) \,\&\,@@@\,\#\,\&\,/@\,\text{allCombs}\ //$$

```
     Partition[#, Length@G] &;

In[∘]:= λ = Eigenvalues[#] & /@ M;
```

```
In[ ]:= ComplexListPlot[λ, PlotRange → Automatic]
Out[ ]=
```


4 × 10^-15
2 × 10^-15
-4 × 10^-15
-2 × 10^-15
2 × 10^-15
4 × 10^-15
-2 × 10^-15
-4 × 10^-15