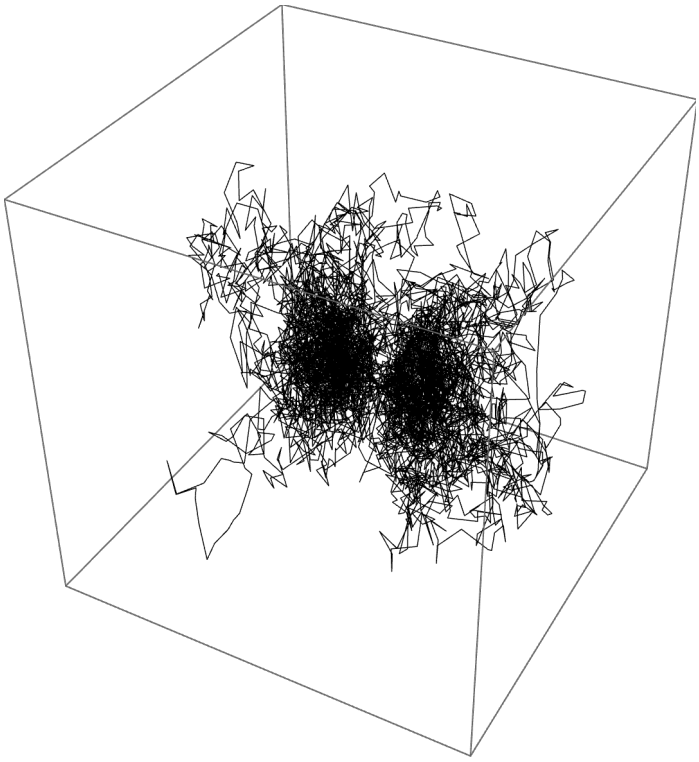
# *trajectory of electron in Hydrogen atom*

## 211 orbit

```
In[•]:= fz = Compile[{{x, _Real, 1}, {dt, _Real}}, Module[{},
           Return[x + ({1 / x[[1]], 0.0, 0.0} - 0.5 * x / Sqrt[x.x]) * dt +
             Sqrt[dt] * Table[Sum[Random[Real, {0, 1}], {12}] - 6, {Length[x]}]]
         ]]
Out[•]=
CompiledFunction[  Argument count: 2
                  Argument types: {{_Real, 1}, _Real} ]

In[•]:= dt := 0.01

In[•]:= n := 100 000

In[•]:= dn := n / 2500

In[•]:= x = Table[{0.0, 0.0, 0.0}, {n}];

In[•]:= y = Table[{0.0, 0.0, 0.0}, {n}];

In[•]:= x[[1]] = {-1., 0., 0.};

In[•]:= y[[1]] = {1., 0., 0.};

In[•]:= Timing[Do[x[[i]] = fz[x[[i - 1]], dt], {i, 2, n}]][[1]]
Out[•]=
1.35235

In[•]:= Timing[Do[y[[i]] = fz[y[[i - 1]], dt], {i, 2, n}]][[1]]
Out[•]=
1.35386

In[•]:= x1 = Table[x[[i]], {i, 1, Length[x], dn}];

In[•]:= y1 = Table[y[[i]], {i, 1, Length[y], dn}];

In[•]:= z = Join[x1, y1];
```

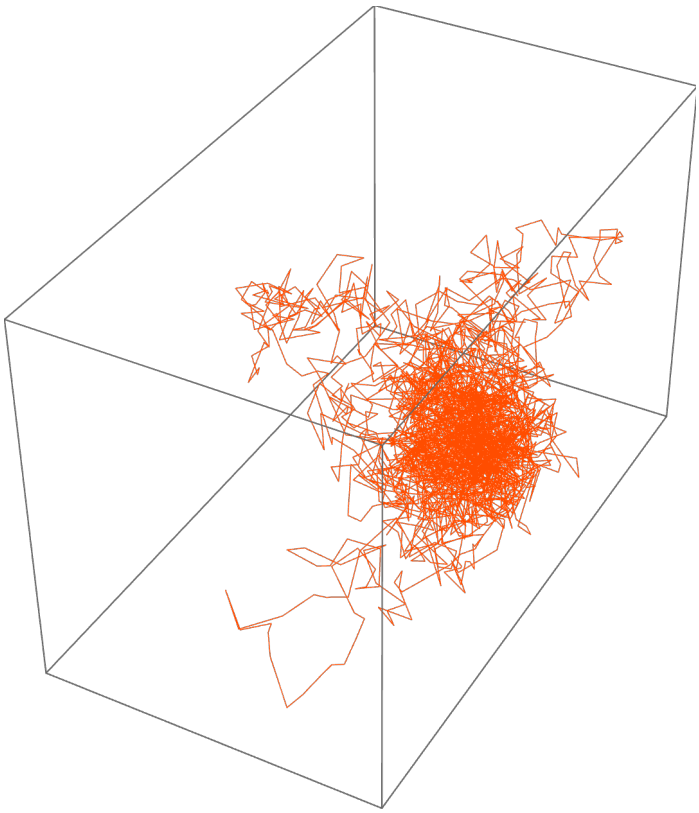
In[•]:=
```
Graphics3D[Line[z], AxesLabel → {"x", "y", "z"},
 ViewPoint → {1.300, -2.400, 2.000}, BoxRatios → {1, 1, 1}]
```

Out[•]=



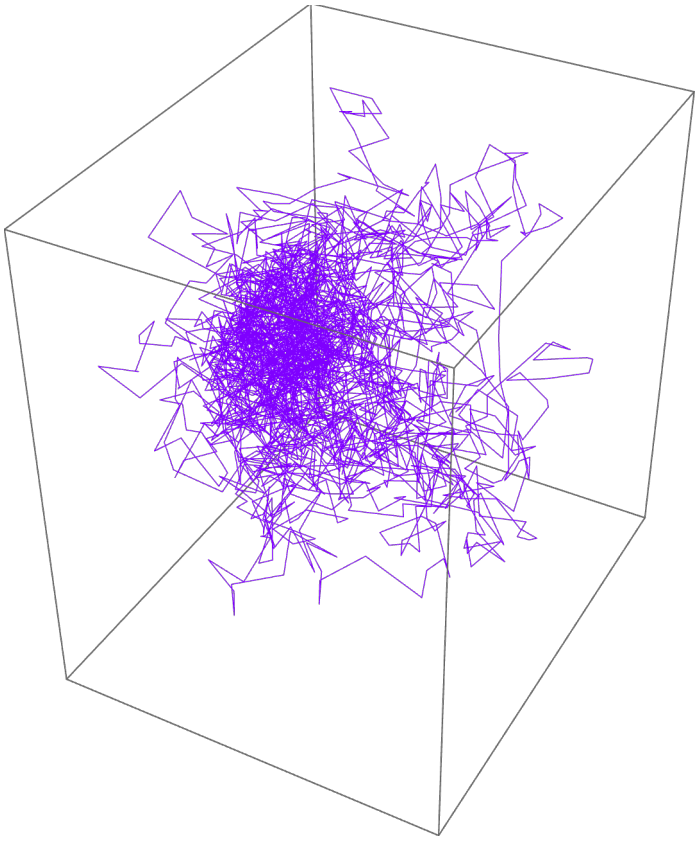
In[•]:=
```
g1 = Graphics3D[{Hue[0.05], Line[x1]}]
```

Out[•]=



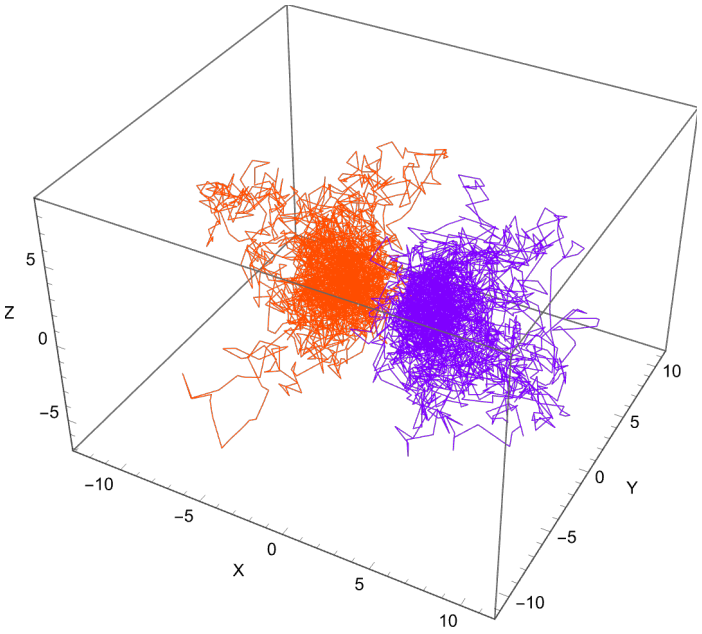
In[ ]:=
```
g2 = Graphics3D[{Hue[0.75], Line[y1]}]
```

Out[ ]=



In[ ]:=
```
Show[{g1, g2}, Axes → True, AxesLabel → {"X", "Y", "Z"}]
```

Out[ ]=




**References**

Excel de Manabu Ryoushi Rikigaku (Learning about Quantum Mechanics with Excel),
Kunio Yasue, Blue Backs, Kodansha, 2001
(in japanese)