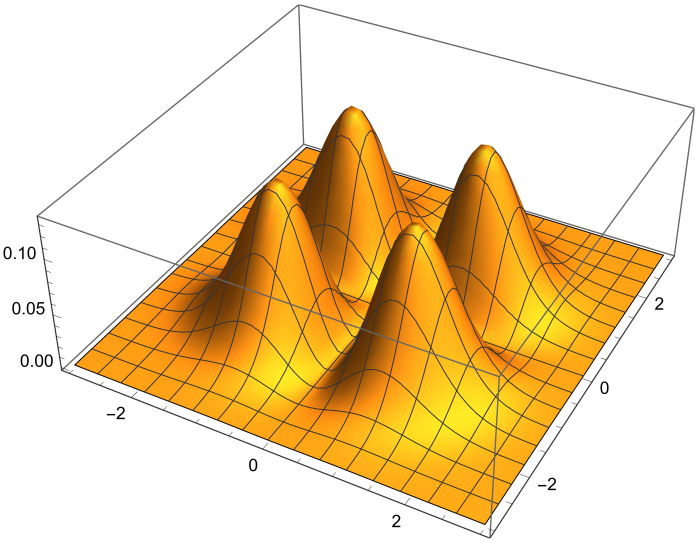
Chaoti Scattering

In[93]:=
```
V[x_, y_] := x^2 y^2 Exp[-x^2 - y^2]
```

In[94]:=
```
Plot3D[V[x, y], {x, -3, 3}, {y, -3, 3}, PlotRange → All, PlotPoints → 50]
```

Out[94]=



In[95]:=
```
aVec[x_, y_] = -Grad[V[x, y], {x, y}] // Simplify
```

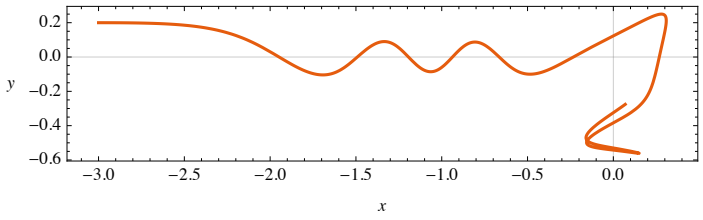
Out[95]=
$$\left\{2\, e^{-x^2-y^2}\, x\, \left(-1+x^2\right)\, y^2,\ 2\, e^{-x^2-y^2}\, x^2\, y\, \left(-1+y^2\right)\right\}$$

In[97]:=
```
tMax = 66;
```

In[104]:=
```
{xs, ys} =
  NDSolveValue[{
    x''[t] == aVec[x[t], y[t]][[1]],
    y''[t] == aVec[x[t], y[t]][[2]],
    x[0] == -3,
    y[0] == 0.2,
    x'[0] == 0.1,
    y'[0] == 0
   }, {x, y}, {t, 0, tMax}];
```

In[109]:=
```
ParametricPlot[{xs[t], ys[t]}, {t, 0, tMax},
 PlotTheme → "Scientific", FrameLabel → {x, y}, RotateLabel → False]
```

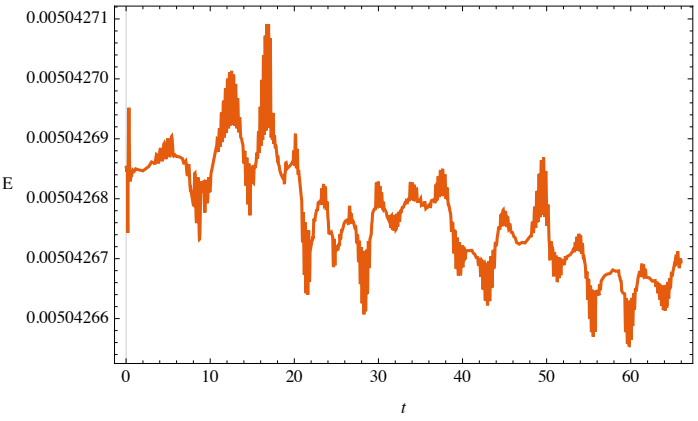
Out[109]=



In[100]:=
$$E[t\_] := \frac{1}{2}\left(xs'[t]^2 + ys'[t]^2\right) + V[xs[t], ys[t]]$$

In[106]:=
```
Plot[E[t], {t, 0, tMax}, PlotTheme → "Scientific",
 FrameLabel → {t, E}, RotateLabel → False]
```

Out[106]=



In[107]:=
```
Plot[E[t], {t, 0, tMax}, PlotTheme → "Scientific",
 PlotRange → {0, 0.01}, FrameLabel → {t, E}, RotateLabel → False]
```

Out[107]=