

SOFT

Parameters

```
In[12]:= ħ = 1.;  
m = 1.;  
L = 200.;  
n = 2.^10;  
dt = 0.01;
```

Grids

```
In[30]:= dx = L / n;  
x = dx Range[-n / 2, n / 2 - 1];  
dp = 2 Pi / L;  
p = dp Range[-n / 2, n / 2 - 1];  
p = RotateLeft[p, n / 2];
```

“Operators”

```
In[95]:= Vx = 0.002 x^2;  
eV = Exp[-I Vx dt / (2 ħ)];  
eP = Exp[-I p^2 dt / (2 ħ m)];
```

Initial Wave Function

```
In[98]:= x0 = -30.; σ = 5.; p0 = 2.;  
ψ0 = Exp[-(x - x0)^2 / (4 σ^2)] Exp[I p0 x / ħ];  
ψ0 = ψ0 / (Norm[ψ0] Sqrt[dx]);
```

One Step

```
In[101]:= oneStep[ψ_] := Module[{u = ψ},  
  u = eV u;  
  u = InverseFourier[eP Fourier[u]];  
  u = eV u]
```

Dynamics

```
In[102]:= dynamics = NestList[oneStep,  $\psi_0$ , 10 000];
```

Frames

```
In[103]:= frames = Abs[dynamics[[;; ;; 50]]]^2;
```

```
In[105]:= ymax = Max[Flatten[frames]]
```

```
Out[105]= 0.252249
```

```
In[107]:= ListAnimate[  
  Table[ListPlot[Transpose[{x, frames[[i]]}], PlotRange → {All, {0, ymax}}, {i, 1, Length[frames]}]]
```

```
Out[107]=
```

