# 结果测试

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In[ ]:=
```
Needs["ConstantPotential`"]
```

# 以电子为例，SI单位制下

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## 求本征能量谱

```
(*电子及势函阱参数设置*)
a = 1.0 * 10^-9;
q = 1.602 * 10^-19;
V0 = 2 q;
μ = 9.01 * 10^-31;
energyOdd = EnergyOdd[V0, 2 a, μ] / q
energyEven = EnergyEven[V0, 2 a, μ] / q
energySpectrum = EnergySpectrum[V0, 2 a, μ] / q
```

Reduce: Reduce was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[ ]=
```
{-1.71085, -0.872367}
```

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Out[ ]=
```
{-1.92737, -1.35531, -0.296593}
```

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Out[ ]=
```
{-1.92737, -1.71085, -1.35531, -0.872367, -0.296593}
```

# 绘制能级图

In[ ]:=
```
Plot[energySpectrum, {x, 0, 1}, AxesOrigin → {0, Floor[energySpectrum[[1]]]},
 AxesLabel → {None, "E/eV"}, Ticks → {None, energySpectrum},
 PlotLabel → Style[StringJoin["奇:", ToString[energyOdd],
    "; 偶:", ToString[energyEven]], FontSize → 11, FontColor → Blue]]
```

Out[ ]=

奇:{−1.71085, −0.872367}; 偶:{−1.92737, −1.35531, −0.296593}


# 求本征函数

## 奇宇称

In[ ]:=
```
u1:=WaveOdd[x,V0,2a,μ,energyOdd[[1]]*q]
u2:=WaveOdd[x,V0,2a,μ,energyOdd[[2]]*q]
ToExpression[u1]
ToExpression[u2]
```

ToExpression: $\begin{cases} 9.04842\times10^{6}\, e^{6.69308\times10^{9}\, x} & x < -1.\times10^{-9} \\ -29496.\, \text{Sin}[2.75155\times10^{9}\, x] & \text{Abs}[x] \le 1.\times10^{-9} \\ -9.04842\times10^{6}\, e^{-6.69308\times10^{9}\, x} & x > 1.\times10^{-9} \\ 0 & \text{True} \end{cases}$ is not a string or a box. ToExpression can only interpret strings or boxes as Wolfram Language input.

Out[ ]=

$Failed

ToExpression: $\begin{cases} 2.57016\times10^{6}\, e^{4.77935\times10^{9}\, x} & x < -1.\times10^{-9} \\ 28757.1\, \text{Sin}[5.4338\times10^{9}\, x] & \text{Abs}[x] \le 1.\times10^{-9} \\ -2.57016\times10^{6}\, e^{-4.77935\times10^{9}\, x} & x > 1.\times10^{-9} \\ 0 & \text{True} \end{cases}$ is not a string or a box. ToExpression can only interpret strings or boxes as Wolfram Language input.

Out[ ]=

$Failed

# 偶宇称

```
v1 := WaveEven[x, V0, 2 a, μ, energyEven[[1]] * q]
v2 := WaveEven[x, V0, 2 a, μ, energyEven[[2]] * q]
v3 := WaveEven[x, V0, 2 a, μ, energyEven[[3]] * q]
ToExpression[v1]
ToExpression[v2]
ToExpression[v3]
Length[Range[-1.5 a, 1.5 a, a / 30]]
```

ToExpression: $\begin{cases} 6.86544\times10^{6}\, e^{7.10398\times10^{9}\, x} & x < -1.\times10^{-9} \\ 29607.5\, \text{Cos}[1.37906\times10^{9}\, x] & \text{Abs}[x] \le 1.\times10^{-9} \\ 6.86544\times10^{6}\, e^{-7.10398\times10^{9}\, x} & x > 1.\times10^{-9} \\ 0 & \text{True} \end{cases}$ is not a string or a box. ToExpression can only interpret strings or boxes as Wolfram Language input.

Out[ ]=

```
$Failed
```

ToExpression: $\begin{cases} 6.42128\times10^{6}\, e^{5.95715\times10^{9}\, x} & x < -1.\times10^{-9} \\ -29262.\, \text{Cos}[4.10861\times10^{9}\, x] & \text{Abs}[x] \le 1.\times10^{-9} \\ 6.42128\times10^{6}\, e^{-5.95715\times10^{9}\, x} & x > 1.\times10^{-9} \\ 0 & \text{True} \end{cases}$ is not a string or a box. ToExpression can only interpret strings or boxes as Wolfram Language input.

Out[ ]=

```
$Failed
```

ToExpression: $\begin{cases} 406290.\, e^{2.78676\times10^{9}\, x} & x < -1.\times10^{-9} \\ 27127.9\, \text{Cos}[6.67849\times10^{9}\, x] & \text{Abs}[x] \le 1.\times10^{-9} \\ 406290.\, e^{-2.78676\times10^{9}\, x} & x > 1.\times10^{-9} \\ 0 & \text{True} \end{cases}$ is not a string or a box. ToExpression can only interpret strings or boxes as Wolfram Language input.

Out[ ]=

```
$Failed
```

Out[ ]=

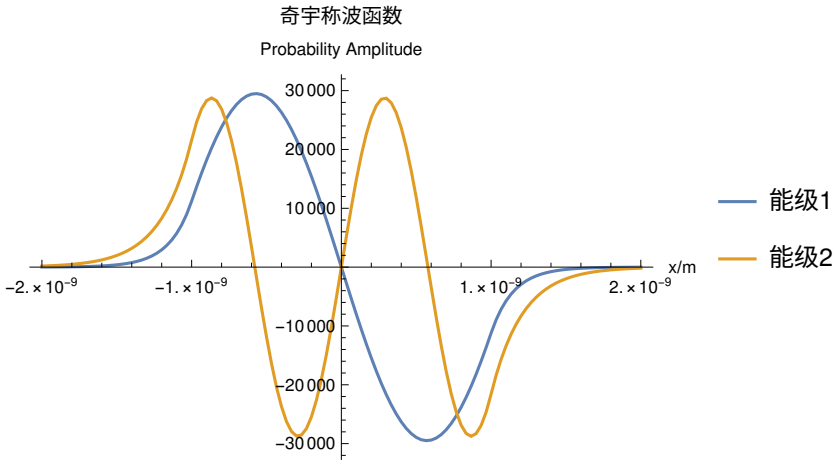
```
91
```

# 绘制波函数（已归一化）图像

## 奇宇称

In[ ]:=
```
xs=Range[-2a,2a,a/30];
ys1=Table[u1/.x→xs[[i]],{i,1,Length[xs]}];
ys2=Table[u2/.x→xs[[i]],{i,1,Length[xs]}];
ListPlot[{Transpose[{xs,ys1}],Transpose[{xs,ys2}]},
    AxesLabel→{"x/m","Probability Amplitude"},
    Joined→True,PlotLegends→{"能级1","能级2"},PlotLabel→"奇宇称波函数"]
```

Out[ ]=



# 偶宇称

In[ ]:=
```
xs=Range[-2a,2a,a/30];
ys1=Table[v1/.x→xs[[i]],{i,1,Length[xs]}];
ys2=Table[v2/.x→xs[[i]],{i,1,Length[xs]}];
ys3=Table[v3/.x→xs[[i]],{i,1,Length[xs]}];
ListPlot[{Transpose[{xs,ys1}],Transpose[{xs,ys2}],Transpose[{xs,ys3}]},
    AxesLabel→{"x/m","Probability Amplitude"},
    Joined→True,PlotLegends→{"能级1","能级2","能级3"},PlotLabel→"偶宇称波函数"]
```

Out[ ]=