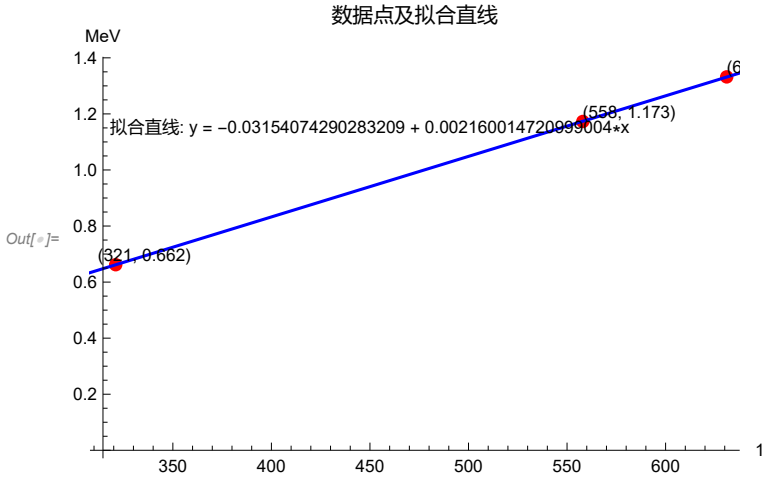
In[ ]:=
```
(*定义数据点*)
data = {{321, 0.662}, {558, 1.173}, {631, 1.332}};

(*线性回归拟合*)
fit = LinearModelFit[data, x, x];
      线性拟合模型

(*新的数据点*)
newData = {310, 275, 223, 179, 147, 121};

(*计算能量*)
calculatedEnergies = fit[#] & /@ newData;

(*输出新数据点及其对应的能量*)
newDataWithEnergies = Transpose[{newData, calculatedEnergies}]
                      转置

(*获取拟合方程*)
fitFunction = fit["BestFit"];

(*绘制数据点和拟合直线，并标出数据点的数值和拟合方程*)
Show[ListPlot[data, PlotStyle → {Red, PointSize[Large]}, AxesLabel → {"1", "MeV"}],
显示 绘制点集          绘图样式        红色 点的大小    大          坐标轴标签
 Plot[fitFunction, {x, 300, 650}, PlotStyle → Blue],
 绘图                                绘图样式       蓝色
 PlotLabel → "数据点及拟合直线", Epilog →
 绘图标签                          绘制主图后绘制的图形
  {Text["(" <> ToString[data[[1, 1]]] <> ", " <> ToString[data[[1, 2]]] <> ")", {312, 0.662},
   文本       转换为字符串                    转换为字符串
    {-1, -1}], Text["(" <> ToString[data[[2, 1]]] <> ", " <> ToString[data[[2, 2]]] <> ")",
               文本       转换为字符串                    转换为字符串
    {558, 1.173}, {-1, -1}], Text["(" <> ToString[data[[3, 1]]] <>
                                  文本       转换为字符串
     ", " <> ToString[data[[3, 2]]] <> ")", {631, 1.332}, {-1, -1}], Text[
           转换为字符串                                              文本
    "拟合直线: y = " <> ToString[Normal[fitFunction], InputForm], {450, 1.2}, {0, 1}]}]
                     转换为…   转换为普通表达式          输入格式

(*计算误差分析*)
Print["拟合方程: ", fitFunction];
打印
Print["拟合参数: ", fit["ParameterTable"]];
打印
Print["决定系数R²: ", fit["RSquared"]];
打印
Print["标准误差: ", fit["EstimatedVariance"]];
打印
```

Out[ ]=
```
{{310, 0.638064}, {275, 0.562463}, {223, 0.450143},
 {179, 0.355102}, {147, 0.285981}, {121, 0.229821}}
```

Out[ ]=



拟合方程：$-0.0315407+0.00216001\,x$

拟合参数：

	Estimate	Standard Error	t-Statistic	P-Value
1	−0.0315407	0.00217351	−14.5114	0.043801
x	0.00216001	4.17632×10^{-6}	517.206	0.00123088

决定系数R^2：0.999996

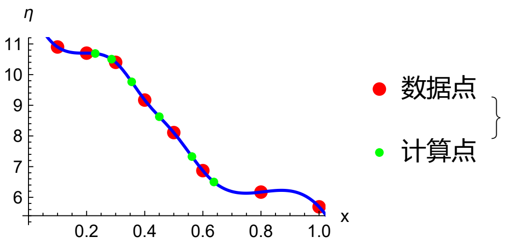
标准误差：9.16255×10^{-7}

In[ ]:=

```
(*拟合η的曲线*)

(*定义数据点*)
data = {{0.1, 10.9}, {0.2, 10.7}, {0.3, 10.4},
   {0.4, 9.17}, {0.5, 8.11}, {0.6, 6.87}, {0.8, 6.17}, {1.0, 5.69}};

(*样条拟合*)
splineFit = Interpolation[data, Method → "Spline"];
            内插                 方法

(*定义需要计算的点*)
points = {0.6380638206068592, 0.562463305371894, 0.4501425398799458,
   0.35510189215598964, 0.28598142108402147, 0.2298210383380474};

(*计算这些点对应的值*)
fittedValues = splineFit /@ points;

(*输出计算结果*)
fittedTable =
  TableForm[Transpose[{points, fittedValues}], TableHeadings → {None, {"x", "η"}}];
  表格形式   转置                                  表格标头         无

(*绘制数据点、拟合曲线及新的计算点*)
plot = Show[ListPlot[data, PlotStyle → {Red, PointSize[Large]}],
       显示   绘制点集      绘图样式      红色  点的大小  大
    AxesLabel → {"x", "η"}, PlotLegends → {"数据点"}],
    坐标轴标签               绘图的图例
   Plot[splineFit[x], {x, 0, 1.1}, PlotStyle → Blue, PlotLabel → "样条拟合"],
   绘图                             绘图样式    蓝色  绘图标签
   ListPlot[Transpose[{points, fittedValues}], PlotStyle → {Green, PointSize[Medium]},
   绘制点集  转置                                  绘图样式     绿色   点的大小  中
    PlotLegends → {"计算点"}], PlotLegends → {"数据点", "样条拟合", "计算点"}];
    绘图的图例                  绘图的图例

(*显示结果表格和图像*)
{fittedTable, plot}
```

Out[ ]=

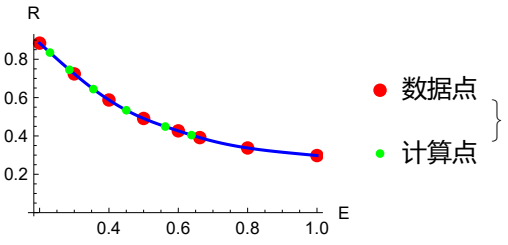
x	η
0.638064	6.49977
0.562463	7.3281
0.450143	8.62785
0.355102	9.76456
0.285981	10.5031
0.229821	10.6876



In[ ]:=
```
(*拟合R的曲线*)

(*定义数据点*)
data = {{0.2, 0.8841}, {0.3, 0.7236}, {0.4, 0.5875}, {0.5, 0.4912},
    {0.6, 0.4266}, {0.662, 0.3914}, {0.8, 0.3373}, {1.0, 0.2977}};

(*样条拟合*)
splineFit = Interpolation[data, Method → "Spline"];
            内插                方法

(*定义需要计算的能量点*)
energyPoints = {0.6380638206068592, 0.562463305371894, 0.4501425398799458,
    0.35510189215598964, 0.28598142108402147, 0.2298210383380474};

(*计算这些能量点对应的值*)
fittedValues = splineFit /@ energyPoints;

(*输出计算结果*)
fittedTable = TableForm[Transpose[{energyPoints, fittedValues}],
              表格形式      转置
   TableHeadings → {None, {"Energy (E)", "R"}}];
   表格标头          无              自然常数

(*绘制数据点和样条拟合曲线及计算点*)
plot = Show[ListPlot[data, PlotStyle → {Red, PointSize[Large]},
       显示  绘制点集          绘图样式       红色  点的大小     大
     AxesLabel → {"E", "R"}, PlotLegends → {"数据点"}],
     坐标轴标签        自然常数   绘图的图例
    Plot[splineFit[x], {x, 0.2, 1.0}, PlotStyle → Blue, PlotLabel → "样条拟合",
    绘图                          绘图样式       蓝色   绘图标签
     AxesLabel → {"E", "R"}], ListPlot[Transpose[{energyPoints, fittedValues}],
     坐标轴标签        自然常数   绘制点集   转置
     PlotStyle → {Green, PointSize[Medium]}, PlotLegends → {"计算点"}],
     绘图样式        绿色   点的大小    中          绘图的图例
    PlotLegends → {"数据点", "样条拟合", "计算点"}];
    绘图的图例

(*显示结果表格和图像*)
{fittedTable, plot}
```

Out[ ]=

Energy (E)	R
0.638064	0.404489
0.562463	0.449096
0.450143	0.534102
0.355102	0.644321
0.285981	0.745083
0.229821	0.83486



In[ ]:=
```
(*定义数组*)
N1 = {12 148, 10 334, 8096, 7488, 6416, 7982};
R = {0.40448890651960123, 0.4490962620538123, 0.5341021068829621,
   0.6443213225242196, 0.7450830049591655, 0.83485976288315};
eta = {6.499772114618485, 7.328101703602218, 8.627846621099549,
   9.76455793754295, 10.503066483228785, 10.687640690255227`};

(*计算公式结果*)
results = N1 / (R * eta);

(*以第一个数据为基准（分母）进行计算*)
normalizedResults = results / results[[1]];

(*输出计算结果*)
TableForm[Transpose[{N1, R, eta, results, normalizedResults}],
 表格形式  转置
 TableHeadings → {None, {"N1", "R", "eta", "Result", "Normalized Result"}}]
 表格标头  无  是否正规化
```

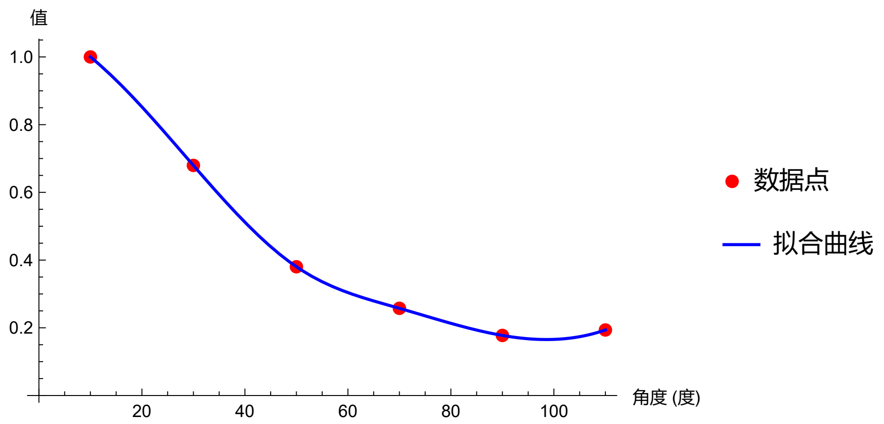
Out[ ]//TableForm=

N1	R	eta	Result	Normalized Result
12 148	0.404489	6.49977	4620.62	1.
10 334	0.449096	7.3281	3140.06	0.679575
8096	0.534102	8.62785	1756.89	0.380228
7488	0.644321	9.76456	1190.17	0.257579
6416	0.745083	10.5031	819.867	0.177437
7982	0.83486	10.6876	894.574	0.193605

In[ ]:=

In[ ]:=
```
(*定义角度和对应的数据点*)angles = {10, 30, 50, 70, 90, 110};
values = normalizedResults;

(*样条拟合*)
splineFit = Interpolation[Transpose[{angles, values}], Method → "Spline"];
                         内插           转置                              方法

(*绘制数据点和拟合曲线*)
plot = Show[ListPlot[Transpose[{angles, values}], PlotStyle → {Red, PointSize[Large]},
       显示   绘制点集   转置                            绘图样式        红色  点的大小    大
    AxesLabel → {"角度 (度)", "值"}, PlotLegends → {"数据点"}],
    坐标轴标签                         绘图的图例
   Plot[splineFit[x], {x, 10, 110}, PlotStyle → Blue,
   绘图                               绘图样式       蓝色
    PlotLabel → "样条拟合曲线", PlotLegends → {"拟合曲线"}]];
    绘图标签                     绘图的图例

(*显示图像*)
plot
```

Out[ ]=



In[ ]:=
```
(*定义角度θ，单位为度*)
theta = {0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120};

(*将角度转换为弧度*)
thetaRad = theta * (Pi / 180);
                   圆周率

(*计算 1-cos(θ)*)
oneMinusCosTheta = N[1 - Cos[thetaRad]];
                   …   余弦

(*计算 hν'*)
hνPrime = 0.662 / (1 + (0.662 / 0.511) * oneMinusCosTheta);

(*计算 a*)
a = ((2.818 * 10^-3)^2 / 2) * (hνPrime / 0.662)^2 *
    (0.662 / hνPrime + hνPrime / 0.662 - Sin[thetaRad]^2);
                                         正弦

(*第一个数为分母，计算 a/7.94112*10^-6*)
normalizedA = a / a[[2]];

(*输出结果表格*)
TableForm[Transpose[{theta, oneMinusCosTheta, hνPrime, a, normalizedA}], TableHeadings →
表格形式    转置                                                          表格标头
  {None, {"θ (度)", "1 - Cos(θ)", "hν'", "a", "a / (7.523829687777629*10^-6)"}}]
   无                  余弦
```

Out[ ]//TableForm=

θ (度)	1 - Cos(θ)	hν'	a	a / (7.523829687777629*10^-6)
0	0.	0.662	7.94112×10^{-6}	1.05546
10	0.0151922	0.649222	7.52383×10^{-6}	1.
20	0.0603074	0.614027	6.45165×10^{-6}	0.857495
30	0.133975	0.564094	5.11918×10^{-6}	0.680396
40	0.233956	0.508024	3.87534×10^{-6}	0.515076
50	0.357212	0.452567	2.89407×10^{-6}	0.384653
60	0.5	0.40176	2.2004×10^{-6}	0.292457
70	0.65798	0.357372	1.74635×10^{-6}	0.232109
80	0.826352	0.319724	1.46672×10^{-6}	0.194943
90	1.	0.28839	1.30445×10^{-6}	0.173376
100	1.17365	0.26265	1.21714×10^{-6}	0.161771
110	1.34202	0.241731	1.17569×10^{-6}	0.156262
120	1.5	0.224922	1.16101×10^{-6}	0.154311

In[ ]:=
```
(*定义角度和对应的两个数据集*)angles = {10, 30, 50, 70, 90, 110};
values1 = normalizedResults;

(*样条拟合*)
splineFit1 = Interpolation[Transpose[{angles, values1}], Method → "Spline"];
splineFit2 = Interpolation[Transpose[{angles, values2}], Method → "Spline"];

(*绘制数据点和拟合曲线*)
plot = Show[ListPlot[Transpose[{angles, values1}], PlotStyle → {Red, PointSize[Large]},
    AxesLabel → {"角度 (度)", "值"}, PlotLegends → {"实验值"}],
   Plot[splineFit1[x], {x, 10, 110}, PlotStyle → Blue, PlotLabel → "实验值拟合曲线",
    PlotLegends → {"实验值"}], ListPlot[Transpose[{angles, values2}],
    PlotStyle → {Green, PointSize[Large]}, PlotLegends → {"理论值"}],
   Plot[splineFit2[x], {x, 10, 110}, PlotStyle → Purple,
    PlotLabel → "理论值拟合曲线", PlotLegends → {"理论值"}]];

(*显示图像*)
plot
```

Out[ ]=