In[1]:=
```
Needs["ErrorBarPlots`"]

MasData5 = {{{44.8, 47.5}, ErrorBar[4.0]},
   {{54.8, 50.1}, ErrorBar[4.2]}, {{64.8, 61.7}, ErrorBar[5.1]},
   {{74.8, 64.8}, ErrorBar[5.5]}, {{84.9, 75}, ErrorBar[6.2]},
   {{94.9, 81.2}, ErrorBar[6.7]}, {{104.9, 85.3}, ErrorBar[7.1]},
   {{119.5, 94.5}, ErrorBar[7.5]}, {{144.1, 101.5}, ErrorBar[8.3]},
   {{144.9, 101.9}, ErrorBar[10.9]}, {{162.5, 117.8}, ErrorBar[12.8]},
   {{177.3, 130.2}, ErrorBar[13.4]}, {{194.8, 147.7}, ErrorBar[17.1]},
   {{219.6, 137.4}, ErrorBar[20.1]}, {{244.8, 176.6}, ErrorBar[20.3]},
   {{267.2, 178.7}, ErrorBar[21.1]}, {{292.3, 200.4}, ErrorBar[29.1]},
   {{60, 55.8}, ErrorBar[4.838]}, {{80, 66.6}, ErrorBar[7.280]},
   {{100, 73.4}, ErrorBar[6.426]}, {{120, 86.7}, ErrorBar[7.245]},
   {{140, 104}, ErrorBar[12.083]}, {{160, 110}, ErrorBar[16.279]},
   {{42.5, 43.8}, ErrorBar[3.482]}, {{55, 57.2}, ErrorBar[3.980]},
   {{65, 62.5}, ErrorBar[4.614]}, {{75, 68.9}, ErrorBar[5.197]},
   {{85, 72.1}, ErrorBar[5.523]}, {{100, 81.9}, ErrorBar[5.368]},
   {{117.5, 95.7}, ErrorBar[6.277]}, {{132.5, 103.9}, ErrorBar[6.912]},
   {{155, 115}, ErrorBar[7.920]}, {{185, 129.1}, ErrorBar[9.192]},
   {{215, 141.7}, ErrorBar[10.666]}, {{245, 140.3}, ErrorBar[14.526]},
   {{275, 189}, ErrorBar[24.274]}, {{49, 39.2}, ErrorBar[10]},
   {{86, 75.7}, ErrorBar[14.414]}, {{167, 118}, ErrorBar[22.828]},
   {{43.2, 50.7}, ErrorBar[1.5]}, {{50, 59.5}, ErrorBar[1.4]},
   {{57.3, 61.8}, ErrorBar[1.9]}, {{65.3, 67.6}, ErrorBar[1.7]},
   {{73.9, 72.4}, ErrorBar[1.9]}, {{83.2, 79.9}, ErrorBar[2.3]},
   {{93.3, 84.4}, ErrorBar[2.1]}, {{104.3, 86.7}, ErrorBar[2.7]},
   {{47.9, 55.4}, ErrorBar[2.1]}, {{68.4, 66.4}, ErrorBar[2.9]}};
(*h1 2006 Q^2=0 data,zeus 2002,zeus 2004 and h1 2013 data for Q^2=0*)
```

In[3]:=
```
gamma = 5.55*^-6;
MJpsi = 3.1;
alphaem = 1 / 137;
```

In[8]:=
```
xg = NN * ((4 * qbar) / ((4 * qbar - MJpsi^2) + w^2))^(-a) * (qbar)^b *
   Exp[Sqrt[16 * Ca / 9 * Log[(4 * qbar - MJpsi^2 + w^2) / (4 * qbar)] *
      Log[Log[qbar / lambda] / Log[qo / lambda]]]];

deriv = D[Log[xg], Log[1 / (((4 * qbar)) / ((4 * qbar - MJpsi^2) + w^2))]]
```

Out[9]=
$$\frac{2\,Ca\,Log\left[\frac{Log\left[\frac{qbar}{lambda}\right]}{Log\left[\frac{qo}{lambda}\right]}\right]}{3\sqrt{Ca\,Log\left[\frac{-9.61+4\,qbar+w^2}{4\,qbar}\right]\,Log\left[\frac{Log\left[\frac{qbar}{lambda}\right]}{Log\left[\frac{qo}{lambda}\right]}\right]}}$$

In[13]:=
```
deriv1[ww_] := deriv /. {Ca → 3.0, qo → 2.0, qbar → 2.4025, lambda → 0.09, w → ww}
(*deriv1[7.0]*)
```

In[14]:=

```
deriv2 = D[(2^(2 * (deriv) + 3) / Sqrt[Pi] * Gamma[deriv + 5 / 2] / Gamma[deriv + 4]) *
    NN * (((4 * qbar)) / ((4 * qbar - MJpsi^2) + w^2))^(-a) * (k)^b *
    Exp[Sqrt[16 * Ca / 9 * Log[(4 * qbar - MJpsi^2 + w^2) / (4 * qbar)] *
       Log[Log[k / lambda] / Log[qo / lambda]]], k];

deriv3[ww_, aa_, bb_, NNN_, kk_] := deriv2 /. {Ca → 3.0, qo → 2.0,
    qbar → 2.4025, lambda → 0.09, w → ww, a → aa, b → bb, NN → NNN, k → kk};

(*deriv3[1.0,2.0,3.0,4.0,5.0]*)
```

In[16]:=

```
lambda = 0.09;
Ca = 3;
qbar = 2.4025;
qo = 2;
alphas[k_] = 4 * Pi / 9 / Log[k / lambda];

(*alphas[7.0];*)

F5[w_, a_, b_, NN_] :=
  3.89379*^5 * 1 / 4.5 / 16 * 4 * Pi^3 * MJpsi^3 * gamma / 12 / alphaem *
   (NIntegrate[alphas[k] / qbar / (qbar + k) * deriv3[w, a, b, NN, k],
       {k, qo, (w^2 - MJpsi^2) / 4}] + 0.118 / qbar / qo * Log[(qbar + qo) / qbar] *
       NN * ((4 * qbar) / ((4 * qbar - MJpsi^2) + w^2))^(-a) *
       (qo)^b * (2^(2 * (deriv1[w]) + 3) / Sqrt[Pi] *
         Gamma[deriv1[w] + 5 / 2] / Gamma[deriv1[w] + 4]))^2;
(*F5[
 1.0,
 2.0,
 3.0,
 4.0]*)

chisq5[a_, b_, NN_] :=
 Sum[((MasData5[[j]][[1]][[2]] - F5[MasData5[[j]][[1]][[1]], a, b, NN]) /
     MasData5[[j]][[2]][[1]])^2, {j, 1, 2}]
(*chisq5[
 .1,
 .2,
 .3]*)
```

In[24]:=
```
rr = Minimize[chisq5[a, b, NN], {a, b, NN}]

(*Out[26]:={1.50641*10^-10,{a→-0.305193,b→0.112788,NN→-0.630418}}!*)
```

NIntegrate: The integrand $\frac{0.581171\left(0.117159\ 0.00119704^{-a}\ 2.^{3.23949-2a}\ b\ e^{5.33747\sqrt{\ll 1 \gg}}\ k^{-1+b}\ NN+\frac{\ll 19 \gg \ll 4 \gg NN}{Log[\ll 1 \gg] \ll 1 \gg}\right)}{(2.4025+k)\ Log[11.1111\ k]}$ has evaluated to non-numerical values for all sampling points in the region with boundaries {{2, 499.357}}.

NIntegrate: The integrand $\frac{0.581171\left(0.117159\ 0.00119704^{-a}\ 2.^{3.23949-2a}\ b\ e^{5.33747\sqrt{\ll 1 \gg}}\ k^{-1+b}\ NN+\frac{\ll 19 \gg \ll 4 \gg NN}{Log[\ll 1 \gg] \ll 1 \gg}\right)}{(2.4025+k)\ Log[11.1111\ k]}$ has evaluated to non-numerical values for all sampling points in the region with boundaries {{2, 499.357}}.

NIntegrate: The integrand $\frac{0.581171\left(0.117159\ 0.00119704^{-a}\ 2.^{3.23949-2a}\ b\ e^{5.33747\sqrt{\ll 1 \gg}}\ k^{-1+b}\ NN+\frac{\ll 19 \gg \ll 4 \gg NN}{Log[\ll 1 \gg] \ll 1 \gg}\right)}{(2.4025+k)\ Log[11.1111\ k]}$ has evaluated to non-numerical values for all sampling points in the region with boundaries {{2, 499.357}}.

General: Further output of NIntegrate::inumr will be suppressed during this calculation.

Out[24]= $\{2.63306\times 10^{-10}, \{a\to -0.305194, b\to 0.112789, NN\to -0.630419\}\}$