Chi^2 Fit f_0

27 November 2018 17:40

Chi²-Fit

Ergebnisse des χ^2-Fits mit einer Lorentz-Funktion

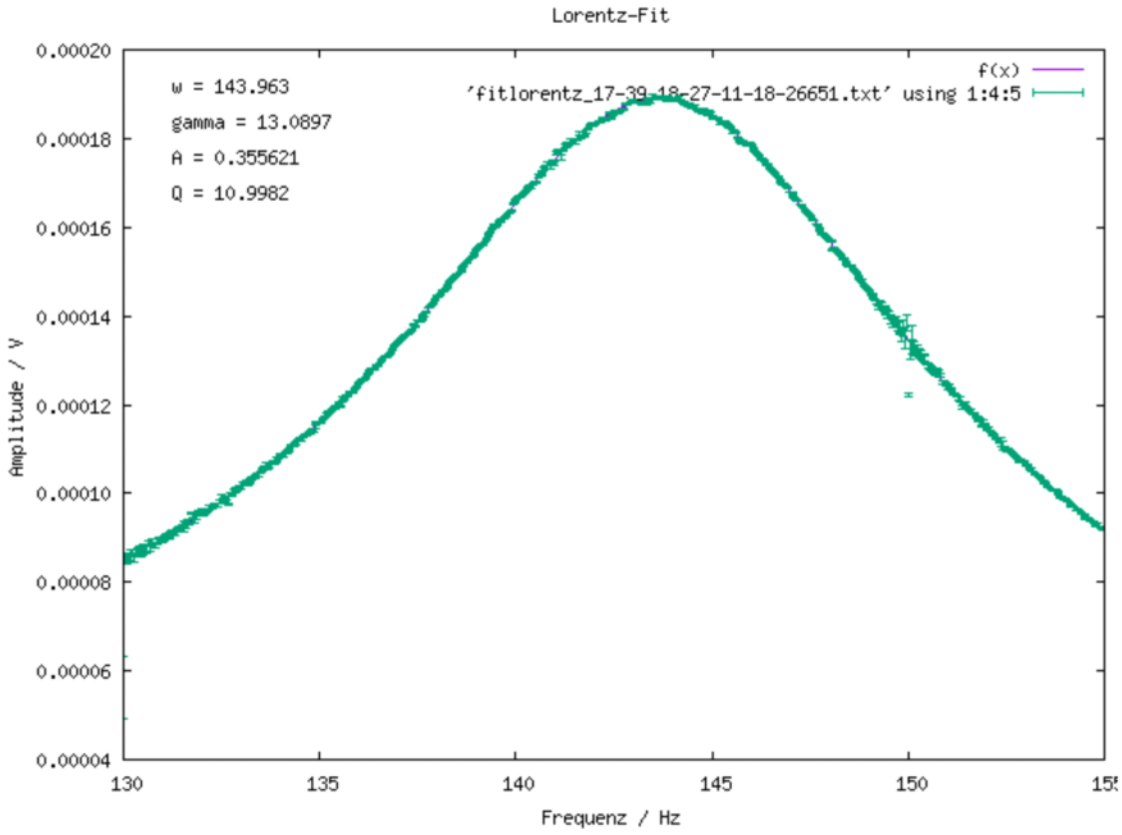
See your data table

```
fit using f(x)=A0/sqrt((w0**2 - x**2)**2+(gamma**2)*(x**2))
fit  [130.0:155.0] f(x) 'fitlorentz_17-39-18-27-11-18-26651.txt' using 1:4:5 via
gamma,w,A
         line 0: warning:
        > Implied independent variable y not found in fit function.
        > Assuming version 4 syntax with zerror in column 3 but no zerror keyword.

iter      chisq       delta/lim  lambda   gamma         A             w
   0 5.6508929280e+07   0.00e+00  3.63e+03    1.100000e+01   2.500000e-01
1.500000e+02
   1 7.3983224944e+06  -6.64e+12  3.63e+02    1.569732e+01   3.564091e-01
1.454440e+02
   2 3.4233643688e+05  -2.06e+13  3.63e+01    1.331060e+01   3.618441e-01
1.434704e+02
   3 2.9474983409e+03  -1.15e+14  3.63e+00    1.313472e+01   3.562974e-01
1.439673e+02
   4 2.6404205746e+03  -1.16e+11  3.63e-01    1.308969e+01   3.556213e-01
1.439629e+02
   * 2.6404206113e+03   1.39e+04  3.63e+00    1.308972e+01   3.556217e-01
1.439629e+02
   * 2.6404206113e+03   1.39e+04  3.63e+01    1.308972e+01   3.556217e-01
1.439629e+02
   * 2.6404206113e+03   1.39e+04  3.63e+02    1.308972e+01   3.556217e-01
1.439629e+02
   * 2.6404206114e+03   1.39e+04  3.63e+03    1.308972e+01   3.556217e-01
1.439629e+02
   * 2.6404206616e+03   3.29e+04  3.63e+04    1.308970e+01   3.556214e-01
1.439629e+02
   * 2.6404208773e+03   1.15e+05  3.63e+05    1.308969e+01   3.556213e-01
1.439629e+02
   * 2.6404206109e+03   1.37e+04  3.63e+06    1.308969e+01   3.556213e-01
1.439629e+02
   * 2.6404205750e+03   1.31e+02  3.63e+07    1.308969e+01   3.556213e-01
1.439629e+02
   * 2.6404205746e+03   1.32e+00  3.63e+08    1.308969e+01   3.556213e-01
1.439629e+02
   * 2.6404205746e+03   1.74e-02  3.63e+09    1.308969e+01   3.556213e-01
1.439629e+02
   * 2.6404205746e+03   8.61e-03  3.63e+10    1.308969e+01   3.556213e-01
```

```
1.439629e+02
   5 2.6404205746e+03   0.00e+00  3.63e+09    1.308969e+01   3.556213e-01
1.439629e+02
iter      chisq       delta/lim  lambda   gamma         A             w

After 5 iterations the fit converged.
final sum of squares of residuals : 2640.42
rel. change during last iteration : 0

degrees of freedom    (FIT_NDF)                       : 623
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 2.0587
variance of residuals (reduced chisquare) = WSSR/ndf   : 4.23824
p-value of the Chisq distribution (FIT_P)              : 0

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
gamma           = 13.0897          +/- 0.00621      (0.04744%)
A               = 0.355621         +/- 0.0001216    (0.03421%)
w               = 143.963          +/- 0.001816     (0.001261%)

correlation matrix of the fit parameters:
                gamma  A      w
gamma           1.000
A               0.945  1.000
w               0.068  0.082  1.000

Q = w/gamma = 10.998189163681
```

Parameter names used by Gnuplot:
WSSR = Weighted Sum of Squared Residuals = χ^2
WSSR/ndf = χ^2 / n.d.f. = reduced χ^2

Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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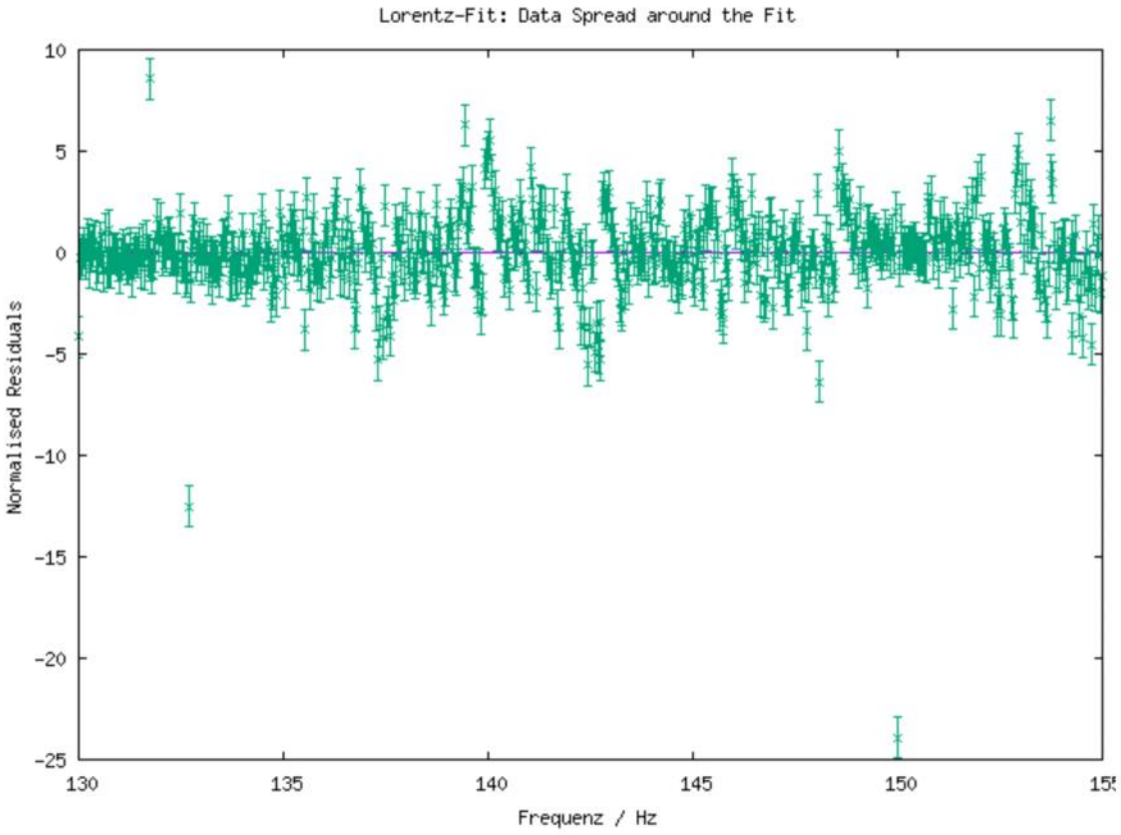
Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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Chi^2 Fit f_1

27 November 2018 17:38

Chi²-Fit

Ergebnisse des χ^2-Fits mit einer Lorentz-Funktion

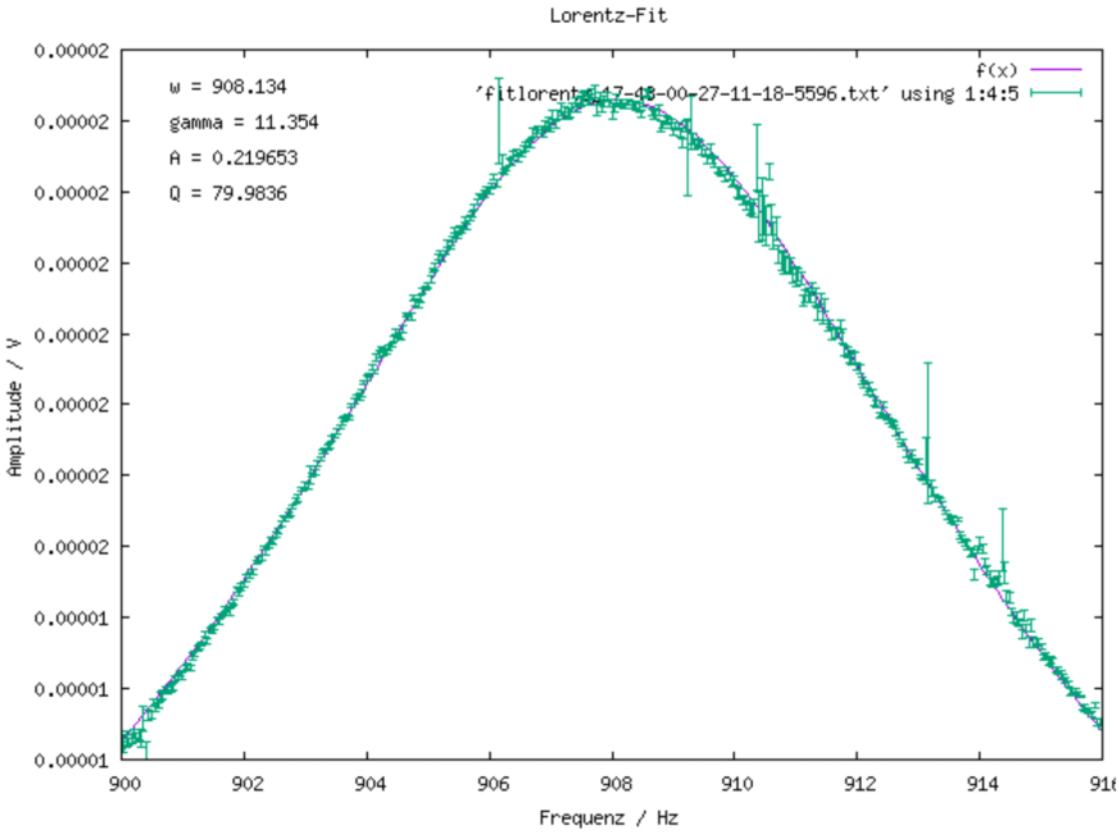
See your data table

```
fit using f(x)=A0/sqrt((w0**2 - x**2)**2+(gamma**2)*(x**2))
fit  [900.0:916.0] f(x) 'fitlorentz_17-43-00-27-11-18-5596.txt' using 1:4:5 via
gamma,w,A
         line 0: warning:
        > Implied independent variable y not found in fit function.
        > Assuming version 4 syntax with zerror in column 3 but no zerror keyword.

iter      chisq       delta/lim  lambda   gamma         A             w
   0 9.4114772194e+06   0.00e+00  2.11e+04    1.100000e+01   3.000000e-01
9.080000e+02
   1 4.6511658196e+06  -1.02e+12  2.11e+03    1.136637e+01   2.853710e-01
9.090326e+02
   2 4.2188709520e+04  -1.09e+14  2.11e+02    1.220497e+01   2.356833e-01
9.083916e+02
   3 1.9049859100e+03  -2.11e+13  2.11e+01    1.145278e+01   2.205677e-01
9.081184e+02
   4 1.5152198978e+03  -2.57e+11  2.11e+00    1.134655e+01   2.195655e-01
9.081350e+02
   5 1.5137811595e+03  -9.50e+08  2.11e-01    1.135401e+01   2.196527e-01
9.081344e+02
   * 1.5137878804e+03   4.44e+06  2.11e+00    1.135375e+01   2.196497e-01
9.081344e+02
   * 1.5137878804e+03   4.44e+06  2.11e+01    1.135375e+01   2.196497e-01
9.081344e+02
   * 1.5137878800e+03   4.44e+06  2.11e+02    1.135375e+01   2.196497e-01
9.081344e+02
   * 1.5137878410e+03   4.41e+06  2.11e+03    1.135376e+01   2.196498e-01
9.081344e+02
   * 1.5137871724e+03   3.97e+06  2.11e+04    1.135393e+01   2.196521e-01
9.081344e+02
   * 1.5137843825e+03   2.13e+06  2.11e+05    1.135400e+01   2.196527e-01
9.081344e+02
   * 1.5137832737e+03   1.40e+06  2.11e+06    1.135401e+01   2.196527e-01
9.081344e+02
   * 1.5137812937e+03   8.86e+04  2.11e+07    1.135401e+01   2.196527e-01
9.081344e+02
   * 1.5137811610e+03   9.36e+02  2.11e+08    1.135401e+01   2.196527e-01
9.081344e+02
   * 1.5137811596e+03   9.34e+00  2.11e+09    1.135401e+01   2.196527e-01
```

```
9.081344e+02
   * 1.5137811595e+03   7.92e-02  2.11e+10    1.135401e+01   2.196527e-01
9.081344e+02
   6 1.5137811595e+03   0.00e+00  2.11e+09    1.135401e+01   2.196527e-01
9.081344e+02
iter      chisq       delta/lim  lambda   gamma         A             w

After 6 iterations the fit converged.
final sum of squares of residuals : 1513.78
rel. change during last iteration : 0

degrees of freedom    (FIT_NDF)                        : 398
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 1.95025
variance of residuals (reduced chisquare) = WSSR/ndf   : 3.80347
p-value of the Chisq distribution (FIT_P)              : 0

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
gamma           = 11.354           +/- 0.01431      (0.1261%)
A               = 0.219653         +/- 0.0002006    (0.0913%)
w               = 908.134          +/- 0.003724     (0.0004101%)

correlation matrix of the fit parameters:
                gamma  A      w
gamma           1.000
A               0.955  1.000
w              -0.081  0.021  1.000

Q = w/gamma = 79.9835987264292
```

Parameter names used by Gnuplot:
WSSR = Weighted Sum of Squared Residuals = χ^2
WSSR/ndf = χ^2 / n.d.f. = reduced χ^2

Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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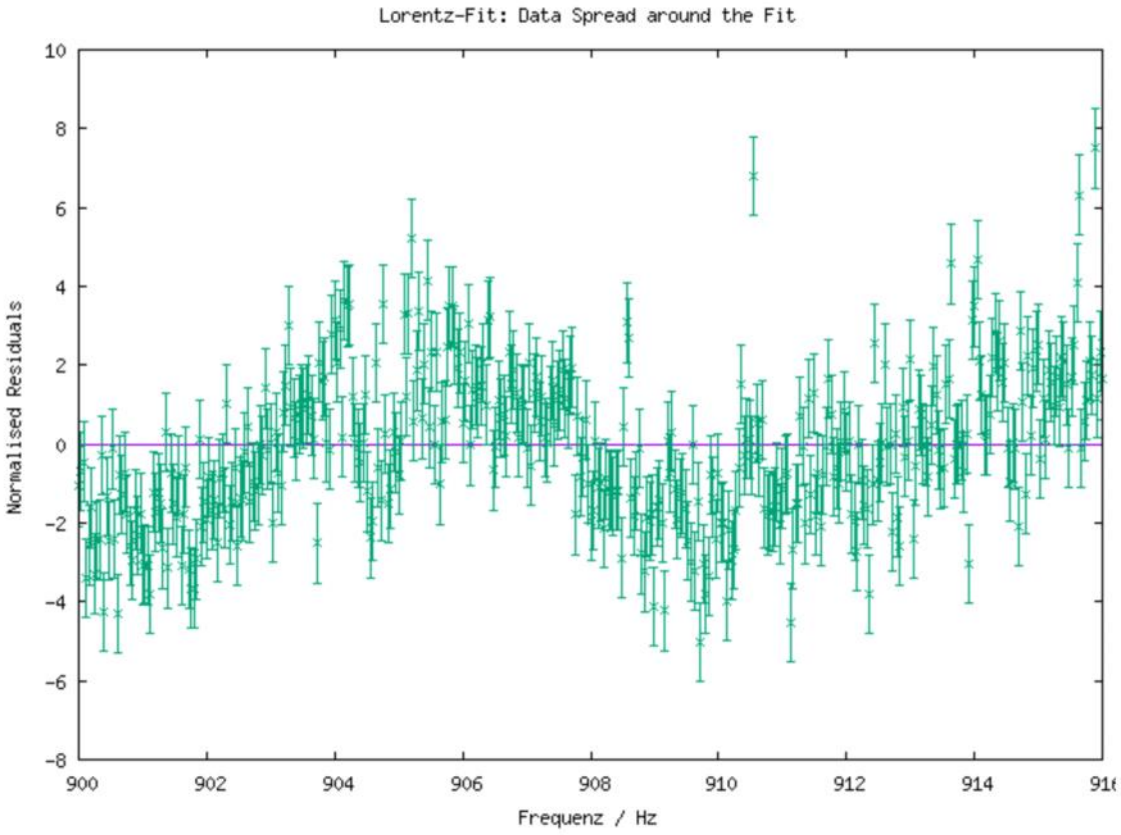
Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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Chi^2 Fit f_2

27 November 2018 17:40

Chi²-Fit

Ergebnisse des χ^2-Fits mit einer Lorentz-Funktion

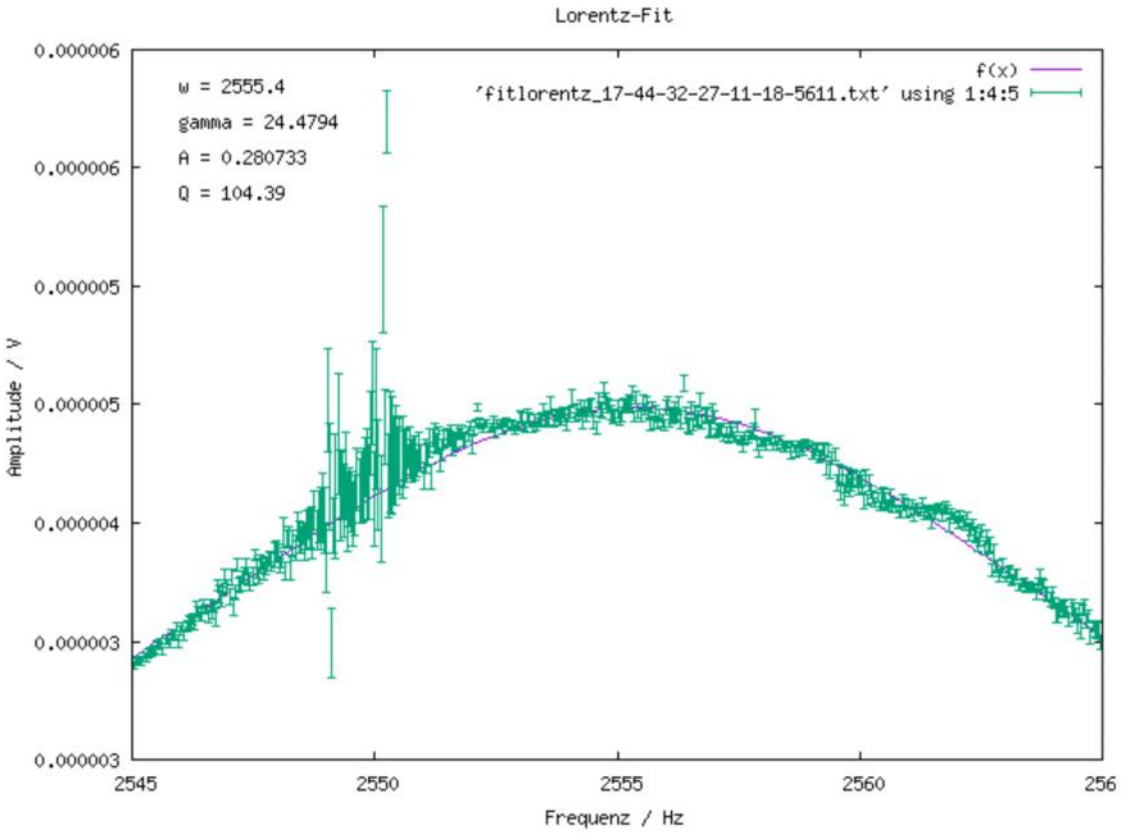
See your data table

```
fit using f(x)=A0/sqrt((w0**2 - x**2)**2+(gamma**2)*(x**2))
fit  [2545.0:2565.0] f(x) 'fitlorentz_17-44-32-27-11-18-5611.txt' using 1:4:5 via
gamma,w,A
         line 0: warning:
        > Implied independent variable y not found in fit function.
        > Assuming version 4 syntax with zerror in column 3 but no zerror keyword.

iter      chisq       delta/lim  lambda   gamma         A             w
   0 7.5140203625e+06   0.00e+00  3.05e+04    1.100000e+01   2.500000e-01
2.555000e+03
   1 6.5982696122e+06  -1.39e+11  3.05e+03    1.114697e+01   2.455594e-01
2.555068e+03
   2 4.8353631024e+05  -1.26e+13  3.05e+02    1.321072e+01   1.937047e-01
2.555236e+03
   3 4.4099186783e+04  -9.96e+12  3.05e+01    1.830478e+01   2.257838e-01
2.555241e+03
   4 3.8139799009e+03  -1.06e+13  3.05e+00    2.280745e+01   2.650125e-01
2.555303e+03
   5 2.1918032606e+03  -7.40e+11  3.05e-01    2.431453e+01   2.792071e-01
2.555385e+03
   6 2.1782239892e+03  -6.23e+09  3.05e-02    2.447150e+01   2.806711e-01
2.555398e+03
   7 2.1781702801e+03  -2.47e+07  3.05e-03    2.447943e+01   2.807329e-01
2.555398e+03
   * 2.1781716661e+03   6.36e+05  3.05e-02    2.447953e+01   2.807335e-01
2.555398e+03
   * 2.1781716661e+03   6.36e+05  3.05e-01    2.447953e+01   2.807335e-01
2.555398e+03
   * 2.1781716661e+03   6.36e+05  3.05e+00    2.447953e+01   2.807335e-01
2.555398e+03
   * 2.1781716661e+03   6.36e+05  3.05e+01    2.447953e+01   2.807335e-01
2.555398e+03
   * 2.1781716650e+03   6.36e+05  3.05e+02    2.447952e+01   2.807335e-01
2.555398e+03
   * 2.1781716286e+03   6.19e+05  3.05e+03    2.447947e+01   2.807329e-01
2.555398e+03
   * 2.1781716676e+03   6.37e+05  3.05e+04    2.447944e+01   2.807327e-01
2.555398e+03
   * 2.1781717530e+03   6.76e+05  3.05e+05    2.447943e+01   2.807329e-01
```

```
2.555398e+03
   * 2.1781709153e+03   2.92e+05  3.05e+06    2.447943e+01   2.807329e-01
2.555398e+03
   * 2.1781702911e+03   5.03e+03  3.05e+07    2.447943e+01   2.807329e-01
2.555398e+03
   * 2.1781702803e+03   5.07e+01  3.05e+08    2.447943e+01   2.807329e-01
2.555398e+03
   * 2.1781702801e+03   5.22e-01  3.05e+09    2.447943e+01   2.807329e-01
2.555398e+03
   8 2.1781702801e+03   0.00e+00  3.05e+08    2.447943e+01   2.807329e-01
2.555398e+03
iter      chisq       delta/lim  lambda   gamma         A             w

After 8 iterations the fit converged.
final sum of squares of residuals : 2178.17
rel. change during last iteration : 0

degrees of freedom    (FIT_NDF)                        : 498
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 2.09137
variance of residuals (reduced chisquare) = WSSR/ndf   : 4.37384
p-value of the Chisq distribution (FIT_P)              : 0

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
gamma           = 24.4794          +/- 0.09492      (0.3877%)
A               = 0.280733         +/- 0.0009408    (0.3351%)
w               = 2555.4           +/- 0.02037      (0.0007971%)

correlation matrix of the fit parameters:
                gamma  A      w
gamma           1.000
A               0.988  1.000
w               0.034  0.038  1.000

Q = w/gamma = 104.389593539997
```

Parameter names used by Gnuplot:
WSSR = Weighted Sum of Squared Residuals = χ^2
WSSR/ndf = χ^2 / n.d.f. = reduced χ^2

Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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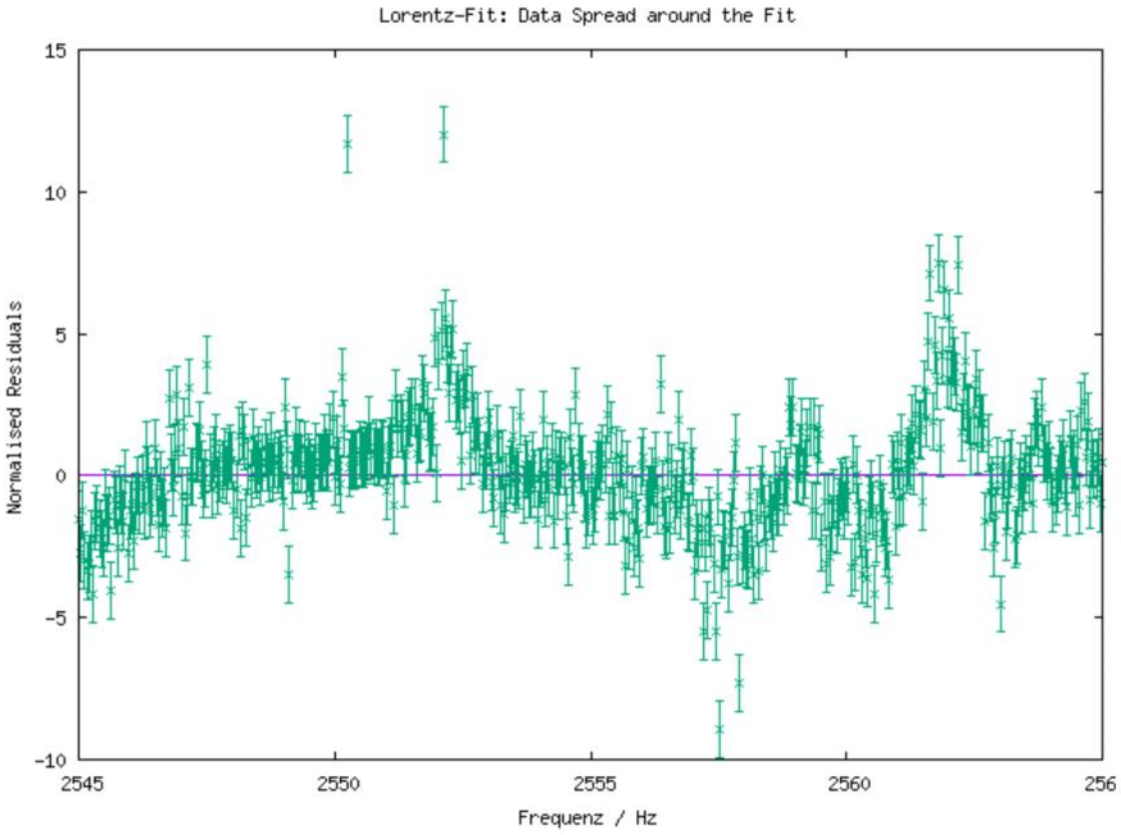
Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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Linear Regression

27 November 2018 17:51

Linearer Fit von Messdaten mit zwei fehlerbehafteten Größen

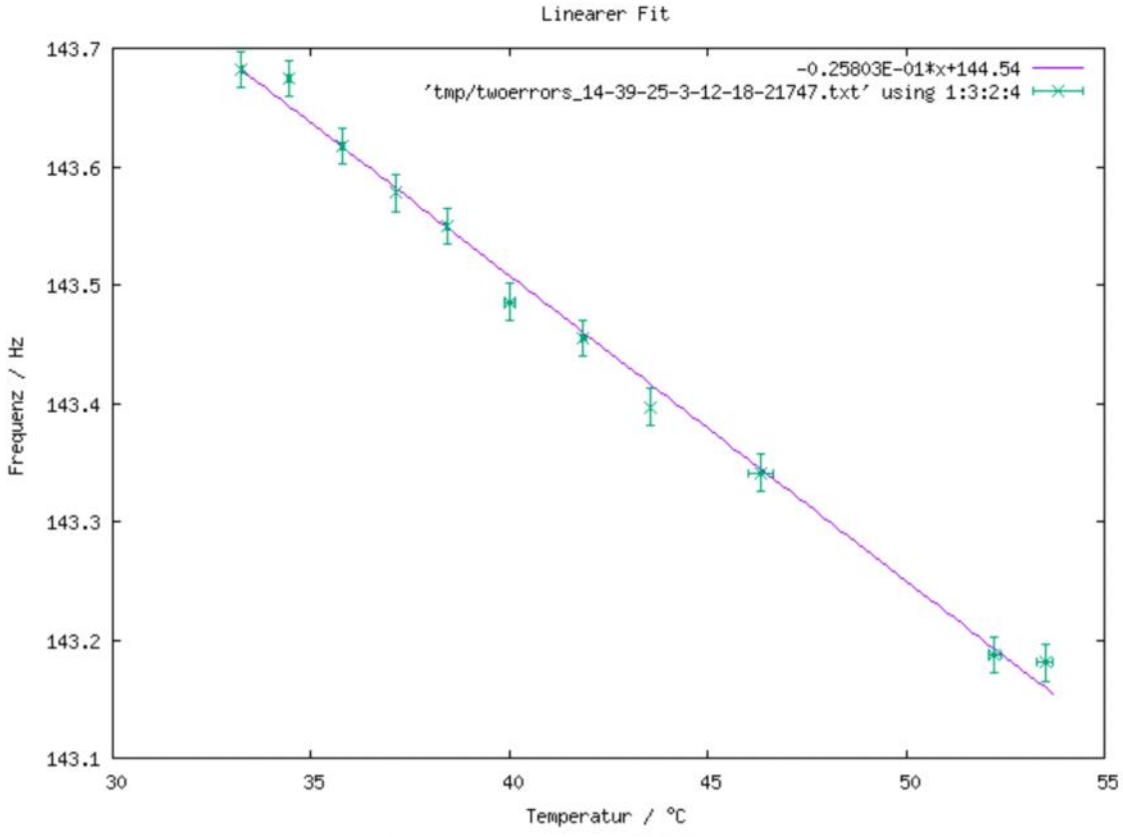
Ergebnisse des Fits mit zwei fehlerbehafteten Größen

See your data table

```
 MINUIT RELEASE 96.03  INITIALIZED.   DIMENSIONS 100/ 50  EPSMAC=  0.89E-15

PARAMETER DEFINITIONS:
   NO.   NAME         VALUE      STEP SIZE      LIMITS
    1 'Y/X-Slope '  -0.30000E-01  0.10000E-05     no limits
    2 'Intercept '    144.00      0.10000E-05     no limits
**********
**    1 **SET NOG
**********
**********
**    2 **CALL   1.000
**********
         11  data points read
**********
**    3 **MIG
**********

FIRST CALL TO USER FUNCTION AT NEW START POINT, WITH IFLAG=4.
START MIGRAD MINIMIZATION.  STRATEGY 1.  CONVERGENCE WHEN EDM .LT. 0.10E-03

FCN=   22861.00     FROM MIGRAD    STATUS=INITIATE       8 CALLS       10 TOTAL
                    EDM= unknown      STRATEGY= 1      NO ERROR MATRIX

 EXT PARAMETER               CURRENT GUESS       STEP         FIRST
 NO.   NAME        VALUE          ERROR          SIZE      DERIVATIVE
  1  Y/X-Slope   -0.30000E-01   0.10000E-05   0.10000E-05  -0.25727E+07
  2  Intercept     144.00       0.10000E-05   0.10000E-05   -64173.

MIGRAD MINIMIZATION HAS CONVERGED.

MIGRAD WILL VERIFY CONVERGENCE AND ERROR MATRIX.
COVARIANCE MATRIX CALCULATED SUCCESSFULLY

FCN=   7.800167     FROM MIGRAD    STATUS=CONVERGED     53 CALLS       55 TOTAL
                    EDM=  0.55E-11    STRATEGY= 1      ERROR MATRIX ACCURATE

 EXT PARAMETER                                       STEP         FIRST
 NO.   NAME        VALUE          ERROR          SIZE      DERIVATIVE
```

```
  1  Y/X-Slope   -0.25803E-01   0.73055E-03   0.16261E-06   0.20482E-01
  2  Intercept     144.54       0.30439E-01   0.68921E-04   0.40722E-03

 EXTERNAL ERROR MATRIX.    NDIM=  50    NPAR=  2    ERR DEF=  1.00
  0.534E-06-0.220E-04
 -0.220E-04 0.927E-03

 PARAMETER  CORRELATION COEFFICIENTS
       NO.  GLOBAL     1     2
        1  0.98812  1.000-0.988
        2  0.98812 -0.988 1.000

 DO THE RESULT VALUES LOOK REASONABLE?
 Did you try to adjust initial parameter values?


gnuplot> EOFEOF
         ^
         line 0: invalid command
```

Klicke auf das Bild um ein schönes EPS-Bild zum Drucken zu bekommen



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