Signal Curve Fitting

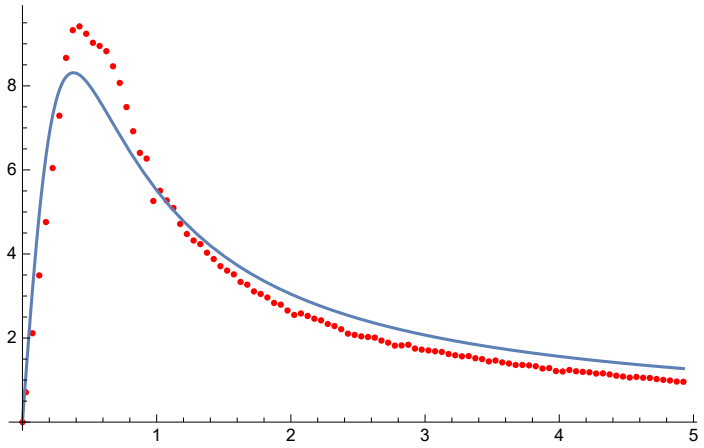
- What follows is a test of one signal function vs two signal functions.
- For the most part, a1, b1 roughly = a2, b2 respectively, with several exceptions.

NDTWM Amplitude scan 100nm - 1, 200nm - 2, and Glycerin -1

- Fit One Signal Function

```
Clear[v]
v = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\NDTWM
    Amplitude scan 100nm - 1, 200nm - 2, and Glycerin -1.csv"]
u = v[[4 ;; All, {2, 4}]]
FindFit[u, (a * (x / b)) / (1 + (x / b)^2), {a, b}, x]
```

```
Show[ListPlot[u, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 16.6225, b → 0.379648}, {x, 0, 4.925}]]
```

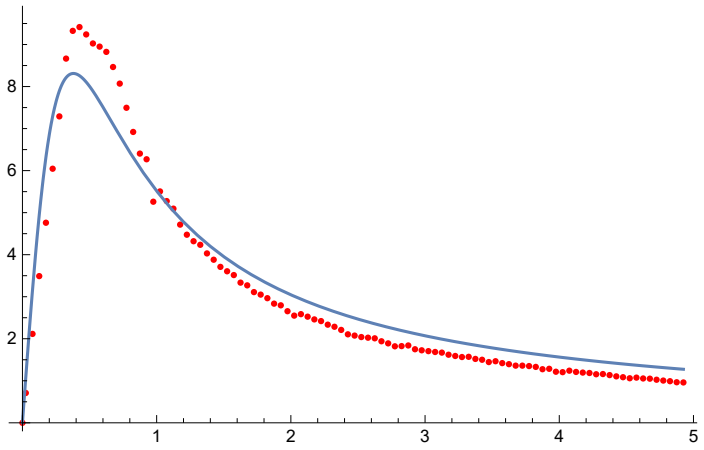


Fitting Sum of Two Signal Functions

```
FindFit[u, ((a * (x/b)) / (1 + (x/b)^2) + (a2 * (x/b2)) / (1 + (x/b2)^2)), {a, b, a2, b2}, x]
```

```
{a → 8.30401, b → 0.379648, a2 → 8.31853, b2 → 0.379648}
```

```
Show[ListPlot[u, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
  {a → 8.30401, b → 0.379648, a2 → 8.31853, b2 → 0.379648}, {x, 0, 4.925}]]
```

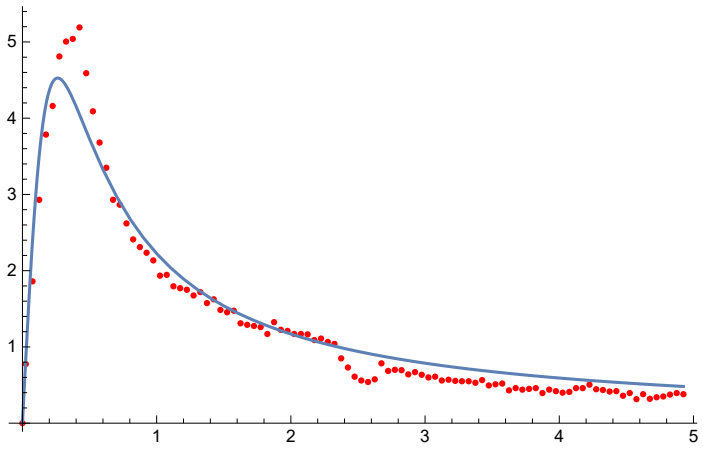


NDTWM Amplitude scan 100 nm, 200 nm, and Glycerin (1)

Fit One Signal Function

```
v1 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\NDTWM
    Amplitude scan 100nm, 200nm, and Glycerin (1).csv"]
u1 = v1[[4 ;; All, {2, 4}]]
FindFit[u1, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

```
Show[ListPlot[u1, PlotStyle → Red],
 Plot[a x / (b (1 + (x / b)^2)) /. {a → 9.05221, b → 0.262742}, {x, 0, 4.925}]]
```

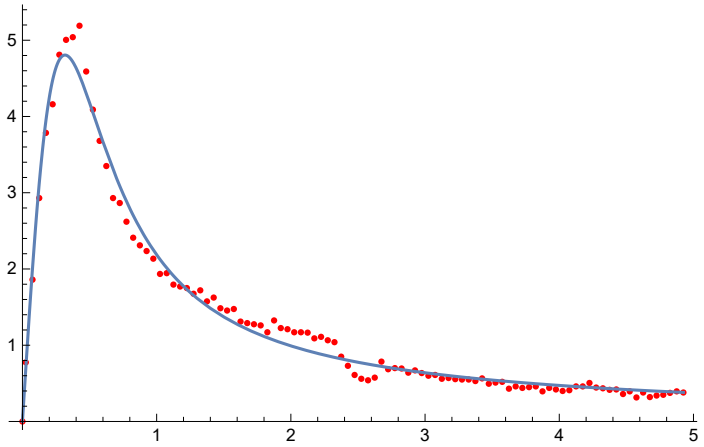


Fitting Sum of Two Functions

```
FindFit[u1,
 ((a * (x / b)) / (1 + (x / b) ^ 2) + (a2 * (x / b2)) / (1 + (x / b2) ^ 2)), {a, b, a2, b2}, x]
```

```
{a → 158.502, b → 0.468763, a2 → 149.899, b2 → -0.48329}
```

```
Show[ListPlot[u1, PlotStyle → Red], Plot[ a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
  {a → 158.502, b → 0.468763, a2 → 149.899, b2 → -0.48329}, {x, 0, 4.925}]]
```



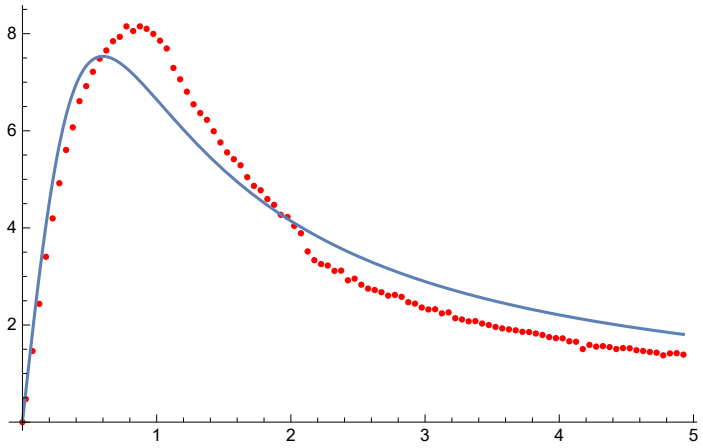
Higher power 33% 100nm, 10% + 33 % 200nm, 1% +33% water

No 7 Power 37 Hz

- Fit One Signal Function

```
v2 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\No 7 Power 37Hz.csv"]
u2 = v2[[4 ;; All, {2, 4}]]
FindFit[u2, (a * (x/b)) / (1 + (x/b)^2), {a, b}, x]
```

```
Show[ListPlot[u2, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 15.0653, b → 0.599399}, {x, 0, 4.925}]]
```

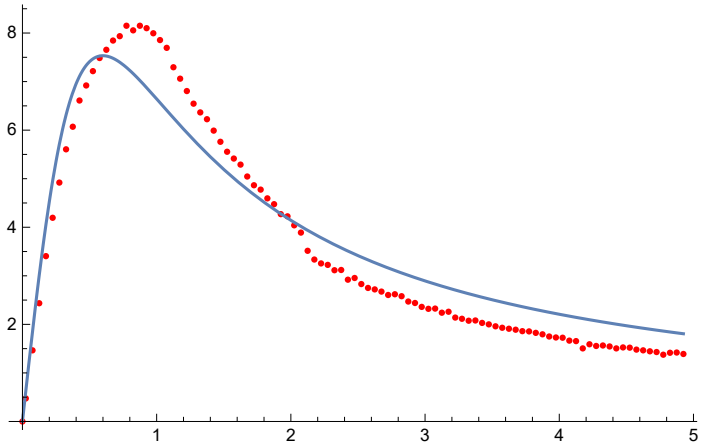


Fitting Sum of Two Functions

```
FindFit[u2,
 ((a * (x/b)) / (1 + (x/b)^2) + (a2 * (x/b2)) / (1 + (x/b2)^2)), {a, b, a2, b2}, x]
```

```
{a → 7.60004, b → 0.599399, a2 → 7.46525, b2 → 0.599399}
```

```
Show[ListPlot[u2, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
  {a → 7.60004, b → 0.599399, a2 → 7.46525, b2 → 0.599399}, {x, 0, 4.925}]]
```

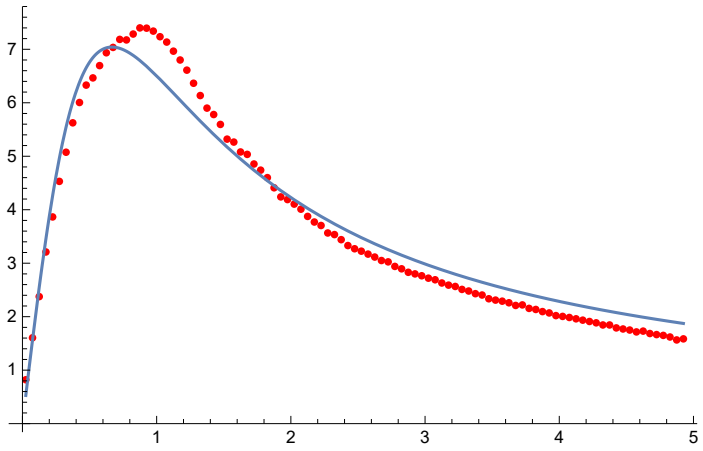


No 7 Power 74 Hz

Fit One Signal Function

```
v3 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\No 7 Power 74Hzz.csv"]
u3 = v3[[4 ;; All, {2, 4}]]
FindFit[u3, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

```
Show[ListPlot[u3, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 14.0835, b → 0.667205}, {x, 0.025, 4.925}]]
```

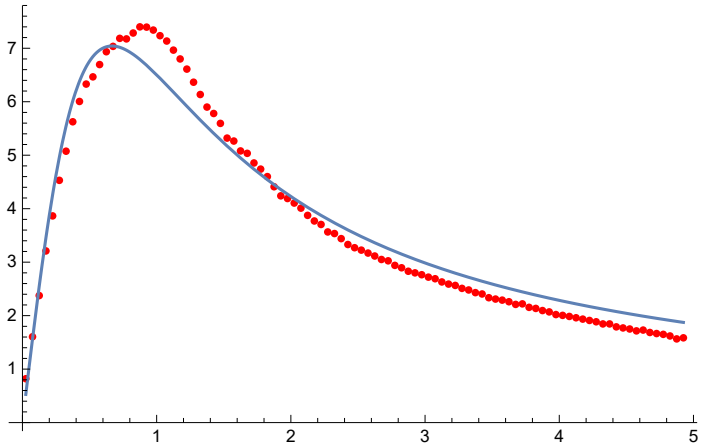


Fitting Sum of Two Functions

```
FindFit[u3,
 ((a * (x / b)) / (1 + (x / b) ^ 2) + (a2 * (x / b2)) / (1 + (x / b2) ^ 2)), {a, b, a2, b2}, x]
```

```
{a → 5.82612, b → 0.667205, a2 → 8.25733, b2 → 0.667205}
```

```
Show[ListPlot[u3, PlotStyle → Red], Plot[a x/(b (1 + (x/b)^2)) + a2 x/(b2 (1 + (x/b2)^2)) /.
  {a → 5.82612, b → 0.667205, a2 → 8.25733, b2 → 0.667205}, {x, 0.025, 4.925}]]
```

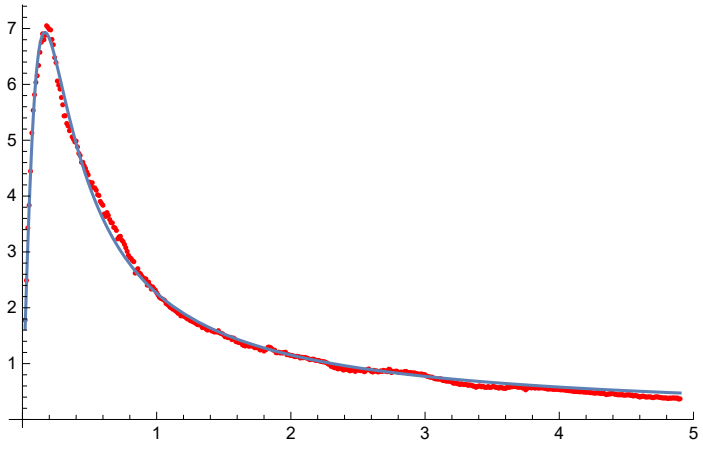


No 7 Power 148 and 170 Hz

Fit One Signal Function

```
v4 =
 Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\No 7 power 148 and 170Hzz.csv"]
u4 = v4[[4 ;; All, {2, 4}]]
FindFit[u4, (a * (x/b))/(1 + (x/b)^2), {a, b}, x]
```

```
Show[ListPlot[u4, PlotStyle → Red],
 Plot[a x/(b (1 + (x/b)^2)) /. {a → 13.8598, b → 0.167663}, {x, 0.02, 4.9}]]
```

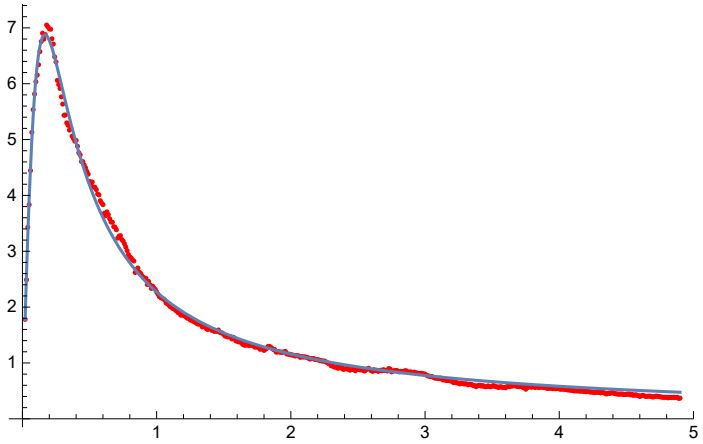


Fitting Sum of Two Functions

```
FindFit[u4,
  ((a * (x / b)) / (1 + (x / b) ^ 2) + (a2 * (x / b2)) / (1 + (x / b2) ^ 2)), {a, b, a2, b2}, x]
```

```
{a → 13.414, b → 0.17175, a2 → 0.658907, b2 → 0.0467836}
```

```
Show[ListPlot[u4, PlotStyle → Red], Plot[ax/(b (1 + (x/b)^2)) + a2 x/(b2 (1 + (x/b2)^2)) /.
    {a → 13.414, b → 0.17175, a2 → 0.658907, b2 → 0.0467836}, {x, 0.02, 4.9}]]
```



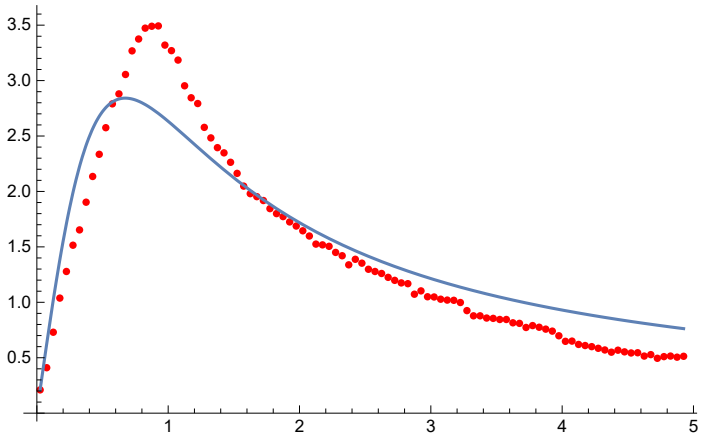
Polystyrene Nanospheres at Different Powers

NDTWM Amplitude scan at different power,200nm,1proc

Fit One Signal Function

```
v5 = Import["NDTWM Amplitude scan at different power, 200nm , 1proc.csv"]
u5 = v5[[4 ;; All, {2, 10}]]
FindFit[u5, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

```
Show[ListPlot[u5, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 5.68341, b → 0.673088}, {x, 0.025, 4.925}]]
```

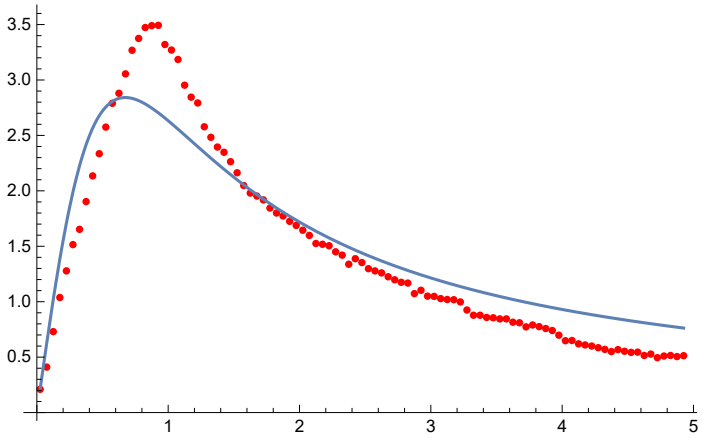


Fitting Sum of Two Functions

```
FindFit[u5,
 ((a * (x/b)) / (1 + (x/b)^2) + (a2 * (x/b2)) / (1 + (x/b2)^2)), {a, b, a2, b2}, x]
```

```
{a → 2.73733, b → 0.673088, a2 → 2.94608, b2 → 0.673088}
```

```
Show[ListPlot[u5, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
   {a → 2.73733, b → 0.673088, a2 → 2.94608, b2 → 0.673088}, {x, 0.025, 4.925}]]
```



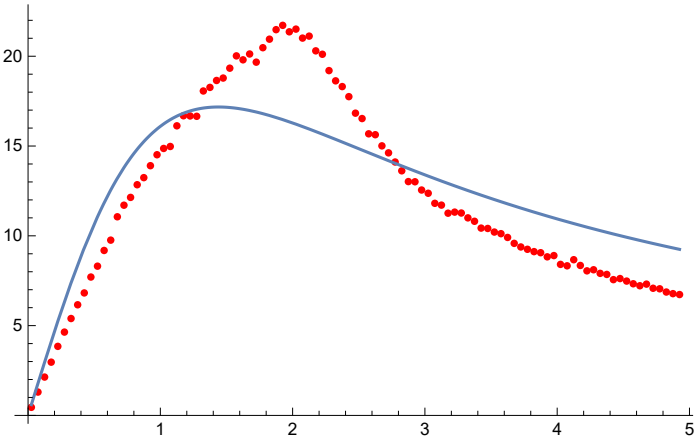
NDTWM Amplitude scan at different power, 100nm, 10proc

Fit One Signal Function

In[12]:=
```
v6 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\100nm, 10 proc.csv"]
u6 = v6[[3 ;; All, {3, 2}]]
FindFit[u6, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

In[15]:=
```
Show[ListPlot[u6, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 34.3466, b → 1.43912}, {x, 0.025, 4.925}]]
```

Out[15]=



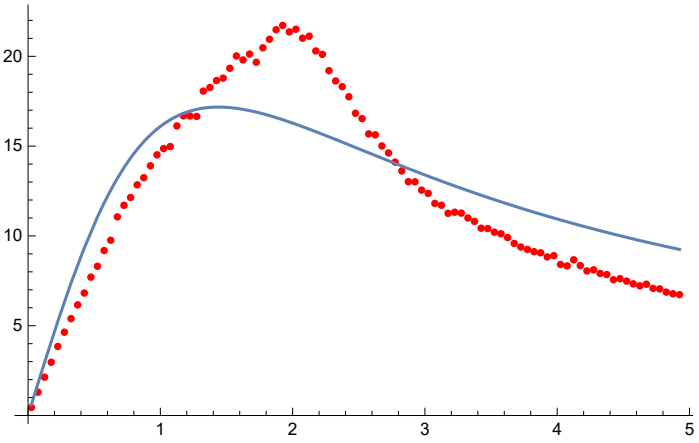
Fitting Sum of Two Functions

In[16]:=
```
FindFit[u6,
 ((a * (x / b)) / (1 + (x / b) ^ 2) + (a2 * (x / b2)) / (1 + (x / b2) ^ 2)), {a, b, a2, b2}, x]
```

Out[16]=
```
{a → 17.0056, b → 1.43912, a2 → 17.3411, b2 → 1.43912}
```

In[17]:=
```
Show[ListPlot[u6, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
  {a → 17.0056, b → 1.43912, a2 → 17.3411, b2 → 1.43912}, {x, 0.025, 4.925}]]
```

Out[17]=



100nm and 200nm Polystyrene NPs in 100um Cuvette

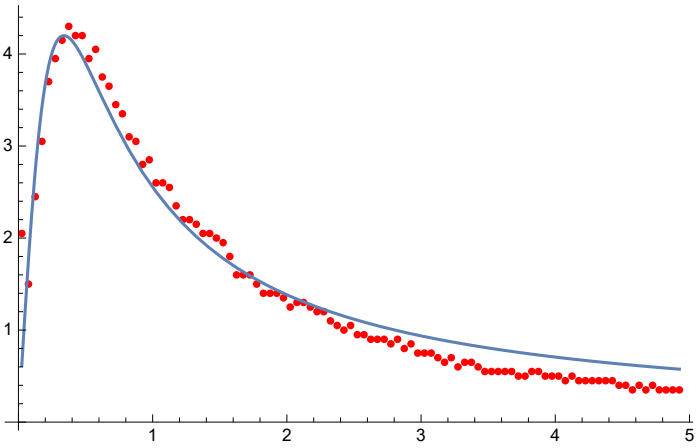
Polystyrene 100nm, 10proc, 100um, Triangle

- ### Fit One Signal Function

In[81]:=
```
v7 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\Polystyrene 100nm,
    10proc, 100um, Triangle.csv"]
u7 = v7[[3 ;; All, {3, 1}]]
FindFit[u7, (a * (x / b)) / (1 + (x / b)^2), {a, b}, x]
```

In[84]:=
```
Show[ListPlot[u7, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 8.39805, b → 0.338942}, {x, 0.025, 4.925}]]
```

Out[84]=



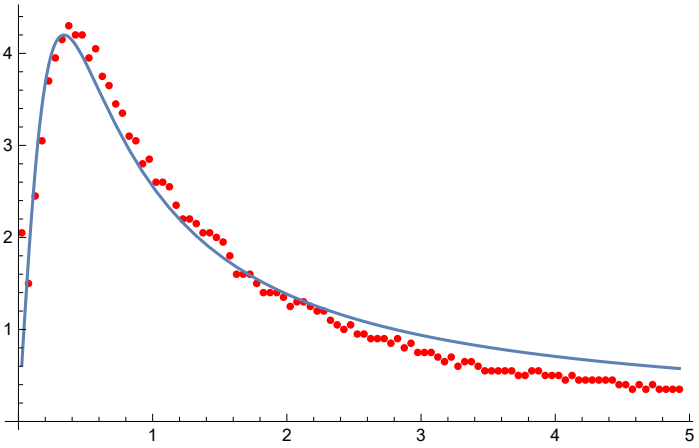
Fitting Sum of Two Functions

In[85]:=
```
FindFit[u7,
 ((a * (x/b)) / (1 + (x/b)^2) + (a2 * (x/b2)) / (1 + (x/b2)^2)), {a, b, a2, b2}, x]
```

Out[85]=
```
{a → 4.94181, b → 0.338942, a2 → 3.45623, b2 → 0.338942}
```

In[86]:=
```
Show[ListPlot[u7, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
  {a → 4.94181, b → 0.338942, a2 → 3.45623, b2 → 0.338942}, {x, 0.025, 4.925}]]
```

Out[86]=



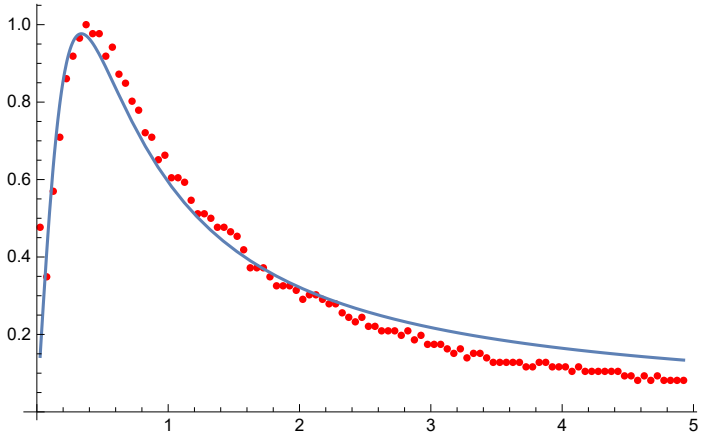
Polystyrene 100 nm, 10 proc, 100 um, Triangle Norm

Fit One Signal Function

```
v8 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\Polystyrene
     100nm, 10proc , 100um, Triangle Norm.csv"]
u8 = v8[[3 ;; All, {1, 3}]]
FindFit[u8, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

In[220]:=
```
Show[ListPlot[u8, PlotStyle → Red],
 Plot[a x / (b (1 + (x / b)^2)) /. {a → 1.95303, b → 0.338942}, {x, 0.025, 4.925}]]
```

Out[220]=



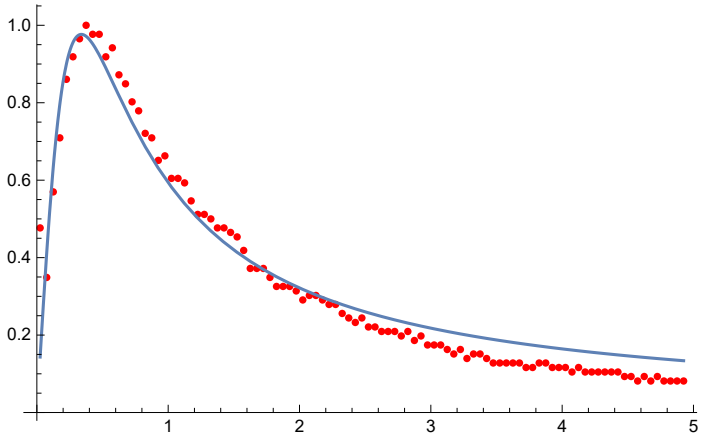
Fitting Sum of Two Functions

In[221]:=
```
FindFit[u8,
 ((a * (x / b)) / (1 + (x / b) ^ 2) + (a2 * (x / b2)) / (1 + (x / b2) ^ 2)), {a, b, a2, b2}, x]
```

Out[221]= {a → 0.833705, b → 0.338942, a2 → 1.11933, b2 → 0.338942}

In[222]:=
```
Show[ListPlot[u8, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
  {a → 0.833705, b → 0.338942, a2 → 1.11933, b2 → 0.338942}, {x, 0.025, 4.925}]]
```

Out[222]=



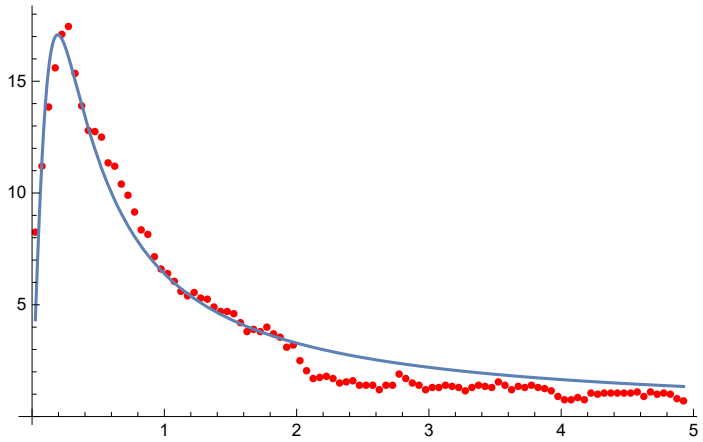
Polystyrene 200 nm, 1 proc, 100 um, Triangle

Fit One Signal Function

In[250]:=
```
v9 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\Polystyrene
    200nm, 1proc , 100um, Triangle!'.csv"]
u9 = v9[[3 ;; 101, {1, 3}]]
FindFit[u9, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

In[253]:=
```
Show[ListPlot[u9, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 34.1574, b → 0.194188}, {x, 0.025, 4.925}]]
```

Out[253]=



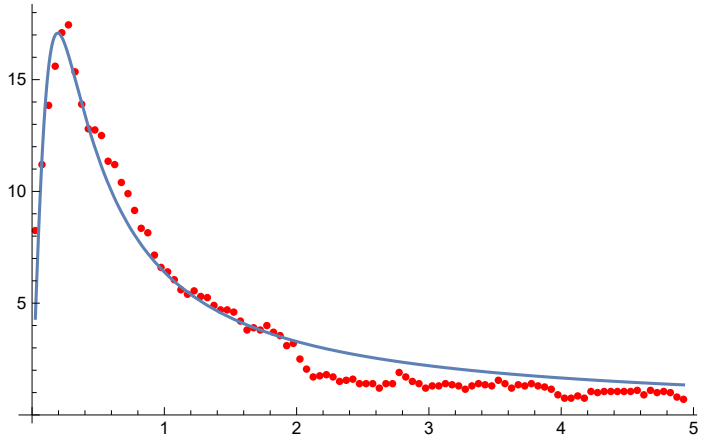
Fitting Sum of Two Functions

In[254]:=
```
FindFit[u9,
  ((a * (x / b)) / (1 + (x / b) ^ 2) + (a2 * (x / b2)) / (1 + (x / b2) ^ 2)), {a, b, a2, b2}, x]
```

Out[254]= $\{a \to 16.9829, b \to 0.194188, a2 \to 17.1745, b2 \to 0.194188\}$

In[255]:=
```
Show[ListPlot[u9, PlotStyle → Red], Plot[ax/(b(1+(x/b)^2)) + a2 x/(b2 (1+(x/b2)^2)) /.
  {a → 16.9829, b → 0.194188, a2 → 17.1745, b2 → 0.194188}, {x, 0.025, 4.925}]]
```

Out[255]=



s

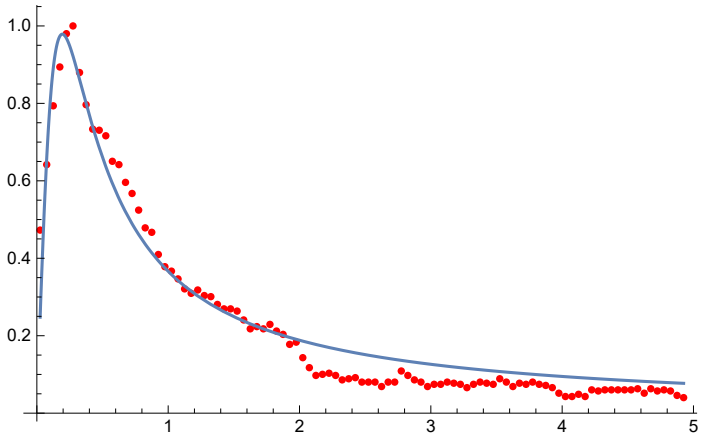
Polystyrene 200 nm, 1 proc, 100 um, Triangle Norm

Fit One Signal Function

In[176]:=
```
v10 = Import["\\\\files.brown.edu\\Home\\nlawandy\\Documents\\Polystyrene
    200nm, 1proc , 100um, Triangle Norm.csv"]
u10 = v10[[3 ;; All, {1, 3}]]
FindFit[u10, (a * (x / b)) / (1 + (x / b) ^ 2), {a, b}, x]
```

In[179]:=
```
Show[ListPlot[u10, PlotStyle → Red],
 Plot[a x / (b (1 + (x/b)^2)) /. {a → 1.95745, b → 0.194188}, {x, 0.025, 4.925}]]
```

Out[179]=



Fitting Sum of Two Functions

In[180]:=
```
FindFit[u10,
 ((a * (x/b)) / (1 + (x/b)^2) + (a2 * (x/b2)) / (1 + (x/b2)^2)), {a, b, a2, b2}, x]
```

Out[180]=
```
{a → 1.98621, b → 0.221657, a2 → 0.117465, b2 → -2.68341}
```

In[181]:=
```
Show[ListPlot[u10, PlotStyle → Red], Plot[a x / (b (1 + (x/b)^2)) + a2 x / (b2 (1 + (x/b2)^2)) /.
 {a → 1.98621, b → 0.221657, a2 → 0.117465, b2 → -2.68341}, {x, 0.025, 4.925}]]
```

Out[181]=