

In[1]:=

$$it = E^{\frac{2\pi \cdot I \cdot D1}{\lambda}} * E^{\frac{2\pi \cdot I \cdot D2}{\lambda}} \int_{d/2 - a/2}^{d/2 + a/2} E^{\frac{2\pi \cdot I \cdot (w-y1)^2}{2 \cdot D1 \cdot \lambda}} * E^{\frac{2\pi \cdot I \cdot (y1-z)^2}{2 \cdot D2 \cdot \lambda}} dy1;$$

$$ib = E^{\frac{2\pi \cdot I \cdot D1}{\lambda}} * E^{\frac{2\pi \cdot I \cdot D2}{\lambda}} \int_{-d/2 - a/2}^{-d/2 + a/2} E^{\frac{2\pi \cdot I \cdot (w-y2)^2}{2 \cdot D1 \cdot \lambda}} * E^{\frac{2\pi \cdot I \cdot (y2-z)^2}{2 \cdot D2 \cdot \lambda}} dy2;$$

In[3]:=

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i = (it + ib);
coni = Conjugate[i];
func = i * coni;
```

In[6]:=

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D1 = 380;
D2 = 500;
λ = .000546;
z = x - 6.4;
d = .353;
a = .1;
```

In[12]:=

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func;
realfunc = 8500 * Re[func];
```

In[14]:=

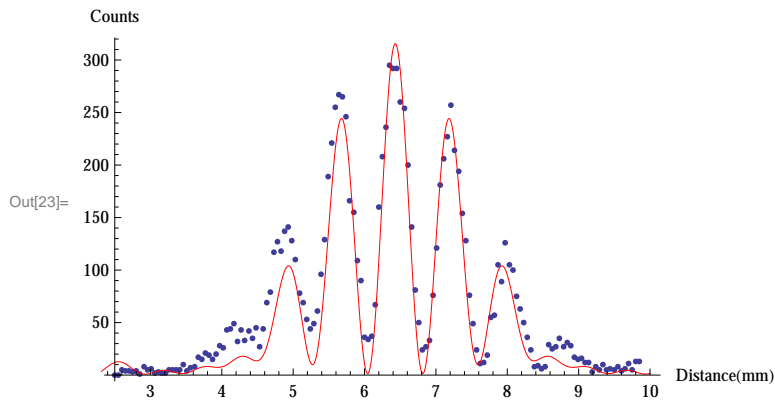
```
SetDirectory["/Users/danikaluntz-martin/Desktop/Advanced Lab/DoubleSlit-ED"];
counts3 = Import["20141122_double_slit_bulb_counts3.csv"];
counts3;
```

In[19]:=

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fit3 = NonlinearModelFit[counts3, realfunc, {{w, 0}}, x];
```

In[22]:=

```
plot3 = Plot[fit3[x], {x, 0, 10}, PlotRange -> All, PlotStyle -> Red];
Show[ListPlot[counts3], plot3,
  AxesLabel -> {Distance [mm], Counts}, PlotRange -> {{2.5, 10}, All}]
```



$$\text{In[24]:= } \mathbf{ChiSq3} = \sum_{j=1}^{145} \left(\frac{\mathbf{fit3["FitResiduals"][[j]]}}{2 \left(\sqrt{\mathbf{counts3}[[j, 2]]} - \sqrt{1.68} \right)} \right)^2$$

$$\mathbf{RedChiSq3} = \mathbf{ChiSq3} / 7$$

Out[24]= 857.116

Out[25]= 122.445