

First run of June 10 2004 data.
Marc Ross

This file contains raw output plots from the June 10 20:45 run after all manual alignment adjustments were complete. Unfortunately, there are only 1612 pulses in this file. The steering is very good on x 1 2, y 1 2 3. This script uses the x y numbers from DDC analysis, computes the correlation coefficients, fits the residual using regression with the full set (x y x' y' I) and with the nominal (x / y only).

The calibration for this uses only the waveform section after point # 180. This is very near the end of the trace. The calibration range used (+/- 100um) was too large, resulting in a lot of saturation. Only 1% of the waveform is used for this analysis. In no case is the earlier part of the wave form used.

There are 5 sets of plots (see table at end) showing the 1) correlation coefficients, 2) ray bundles, 3) histograms of raw beam distributions, 4) raw beam motion vs time and 5) residual, after regression linear least square, for each of the 12 signals.

The first set of numbers lists the number of pulses remaining after cutting out the fliers (+/- 2 sigma).

```
%script for notebook of ResCorr data
%
%start with the basic script so the numbers are there
CalcResid;
cutsig =
    2
ObservePulses =
    1612
Tmit cut 1573
  cutx 1 1524
  cuty 1 1448
  cutxp 1 1423
  cutyp 1 1393
keepers =
    0.8641
  cutx 2 1390
  cuty 2 1384
  cutxp 2 1383
  cutyp 2 1379
keepers =
    0.8555
  cutx 3 1378
  cuty 3 1378
  cutxp 3 1378
  cutyp 3 1366
keepers =
    0.8474
```

The above is the number of 'keepers' in this file.

These are the correlation coefficients of the full 1612 pulses. There are 5 plots, (Figures 1-5) corresponding to the 5 different signals – x y x' y' I. Note the problems with the angles. A proper angle calibration was never done.

```
%Plot the correlation coefficients by plane /pos-angle
%
us=strfind(ResCorr.FileName,'\ ');fname=ResCorr.FileName(us(end-1):end);
%start with the uncut
%first cell...
plot(ResCorr.CorrcoefUncut(:,1:3),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([ResCorr.FileName ' ResCorr.CorrcoefUncut
X'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;
```

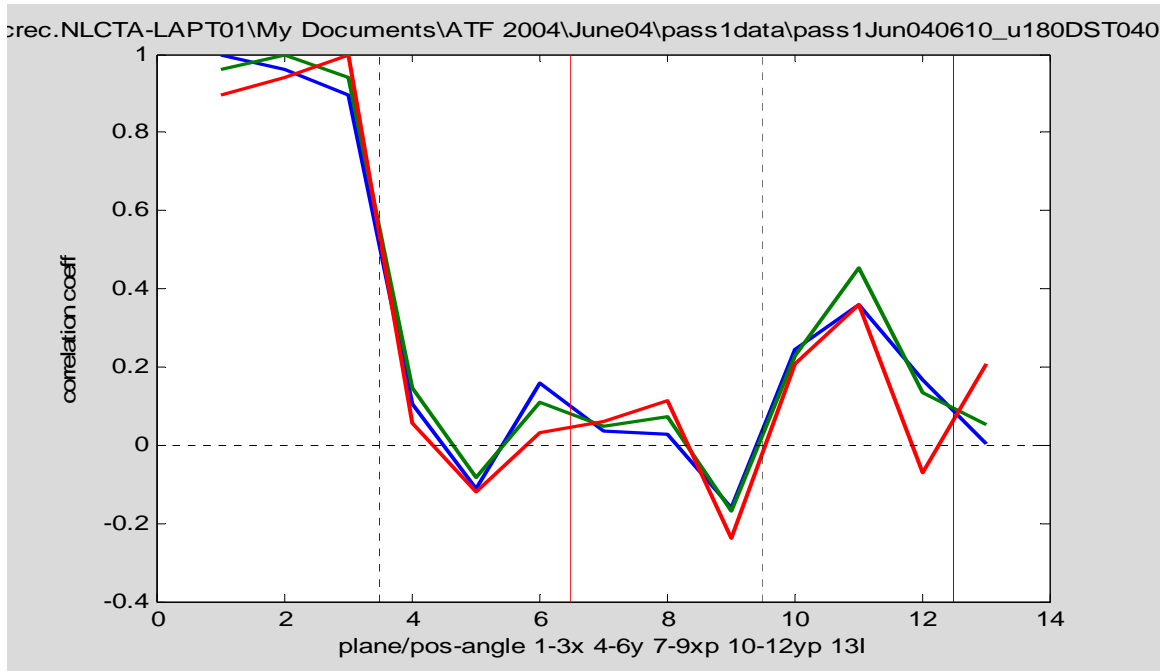


Figure 1

```
%
plot(ResCorr.CorrcoefUncut(:,4:6),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.CorrcoefUncut Y'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;
```

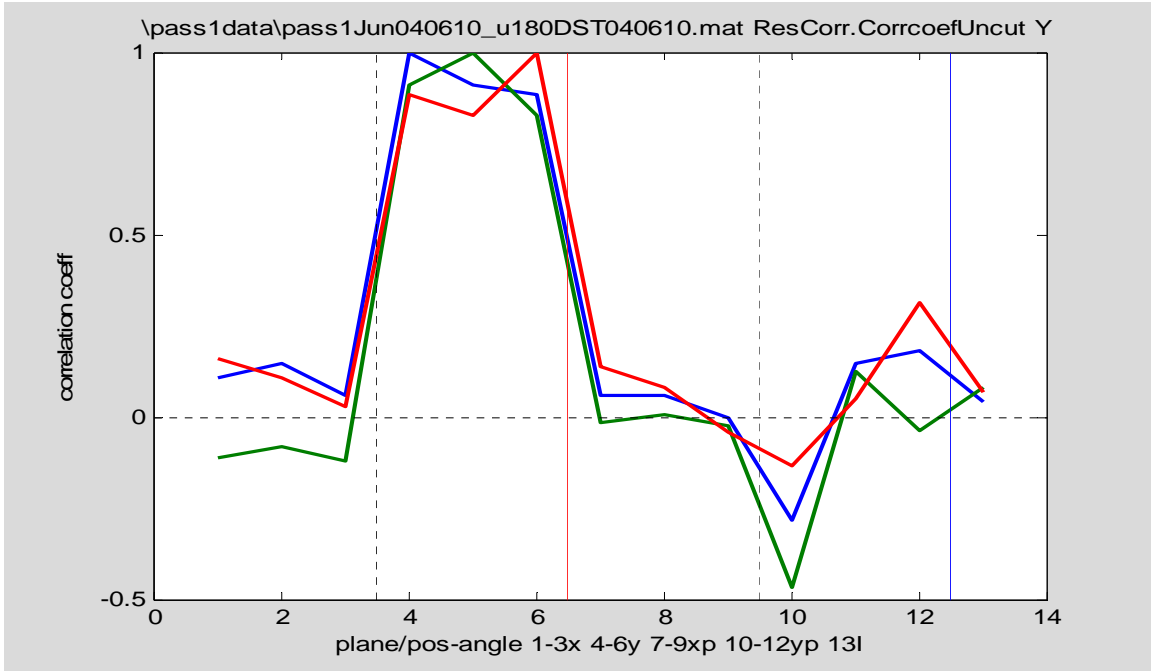


Figure 2

```
%
plot(ResCorr.CorrcoefUncut(:,7:9),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.CorrcoefUncut XP'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;
```

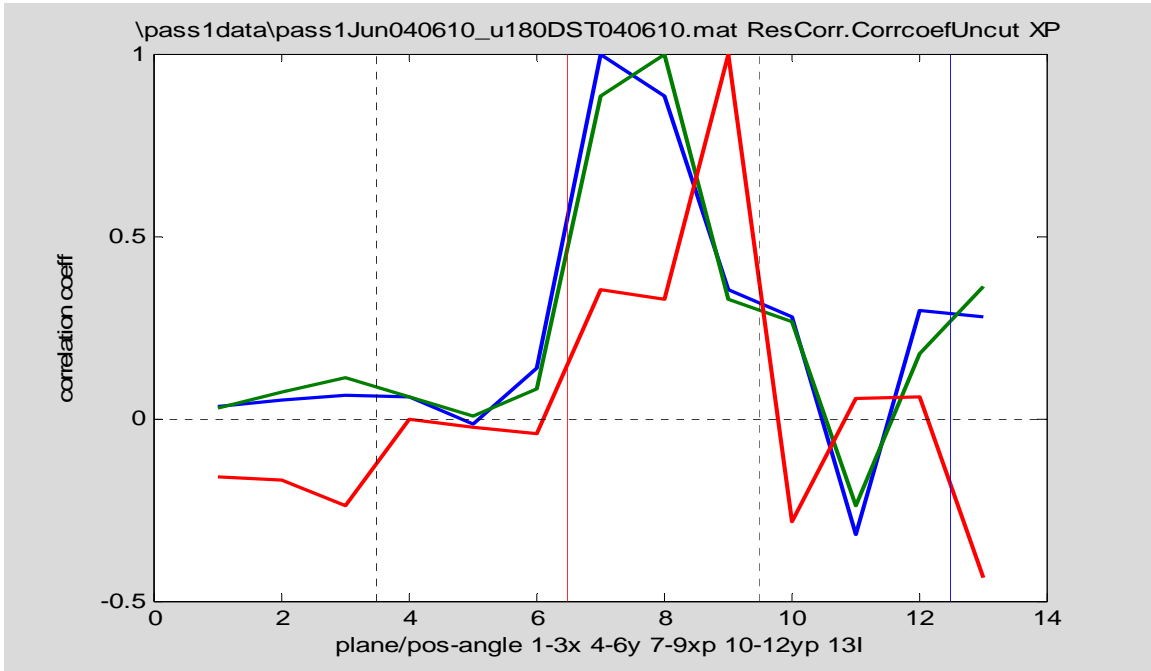


Figure 3 Correlation coefficients – uncut pulses (1612) for x'. Note problem with 3x'

```

%
plot(ResCorr.CorrcoefUncut(:,10:12),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.CorrcoefUncut YP'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;

```

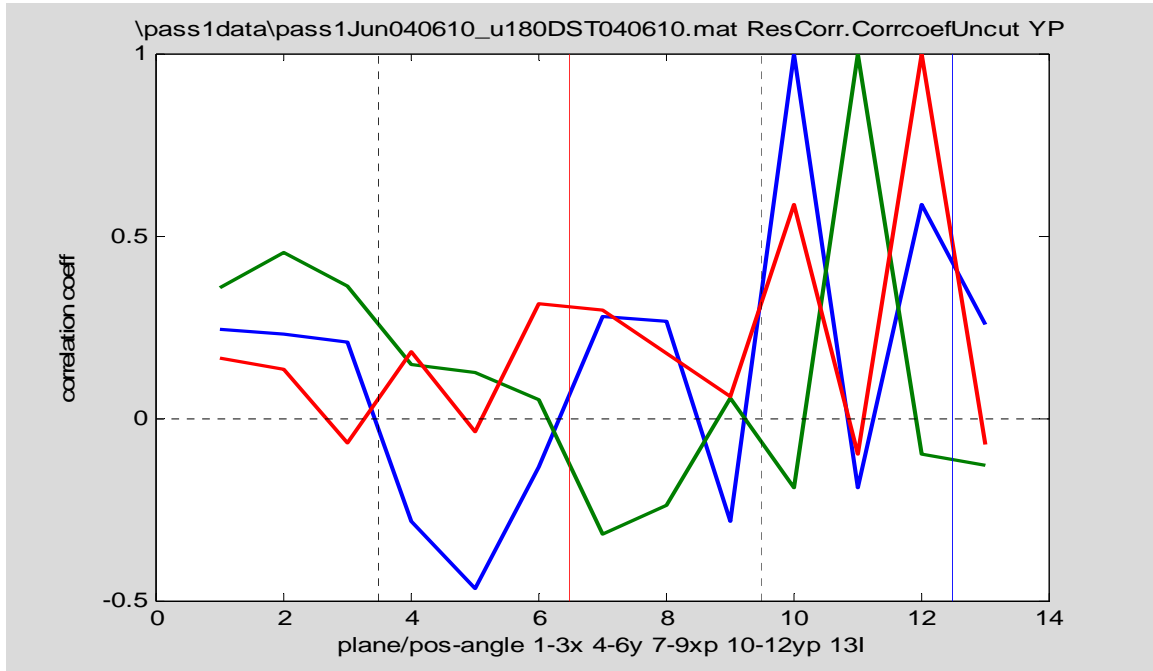


Figure 4 Correlation coefficients – uncut pulses (1612) for y'. Note problem with 2y'

```

%
plot(ResCorr.CorrcoefUncut(:,13),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.CorrcoefUncut I'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;

```

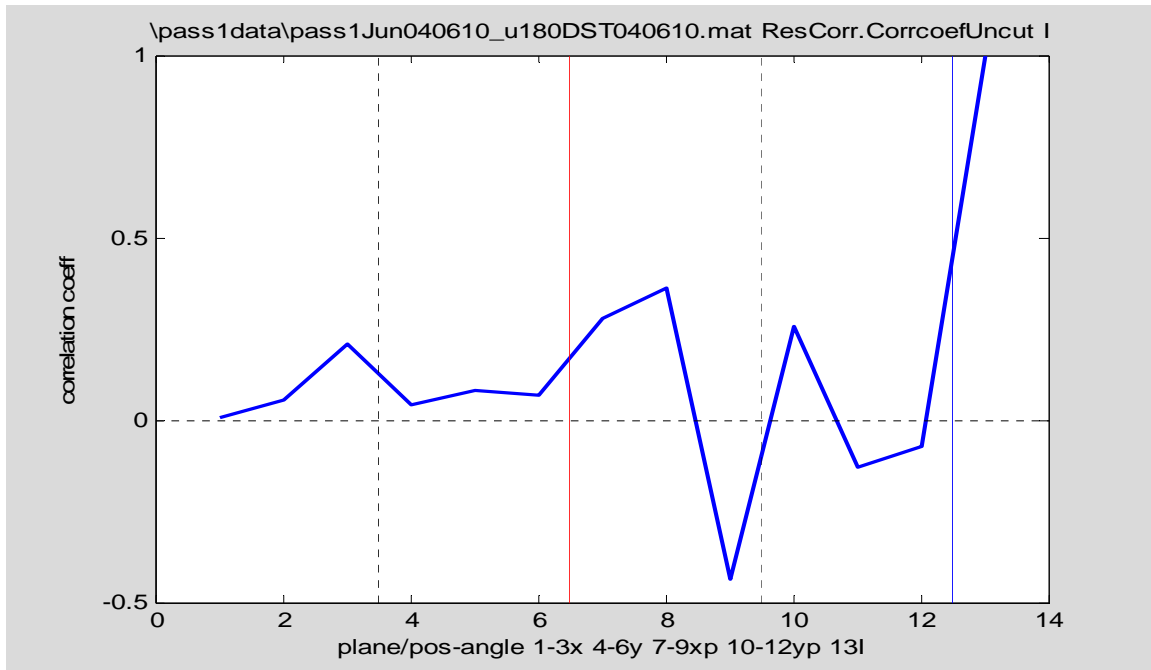


Figure 5 Correlation coefficients - Intensity

%

The following (Figures 6 -10) are the same, but for the cut sample. The plots look much cleaner but the basic characteristics remain.

%now the cut

%first cell...

```

plot(ResCorr.Corrcoef(:,1:3),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([ResCorr.FileName ' ResCorr.Corrcoef X'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;

```

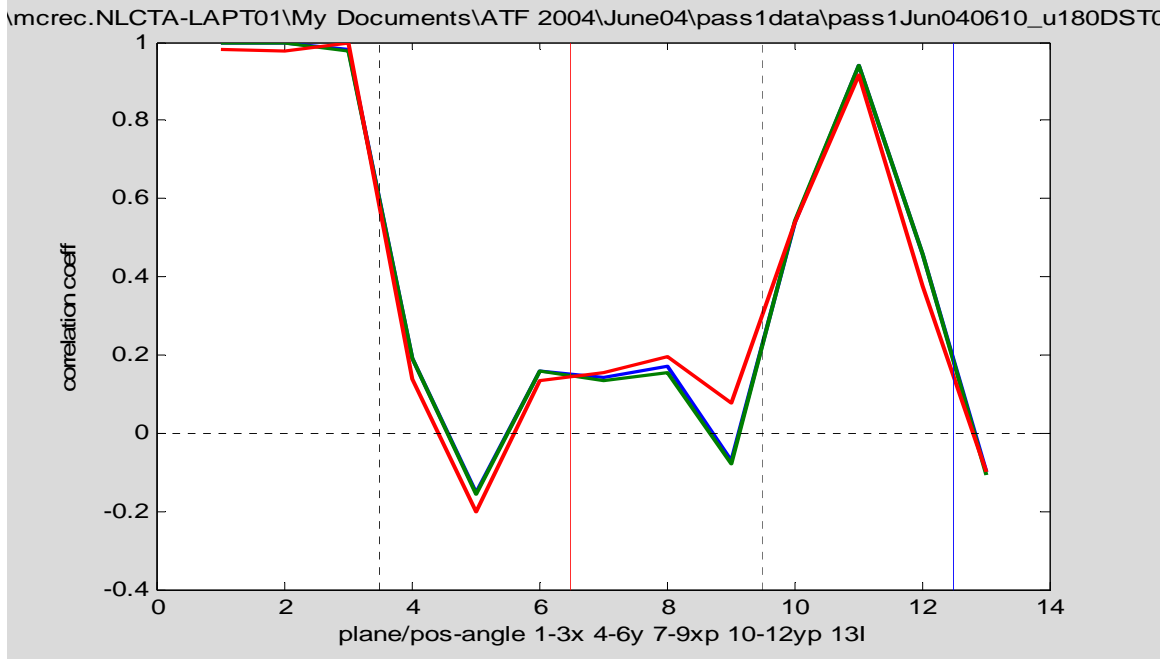


Figure 6 Correlation coefficient – x – for the cut data

```
%
plot(ResCorr.Corrcoef(:,4:6), 'LineWidth', 2)
ver_line(3.5);ver_line(6.5, 'r');ver_line(9.5);ver_line(12.5, 'b');
title([fname ' ResCorr.Corrcoef Y'], 'Interpreter', 'none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;
```

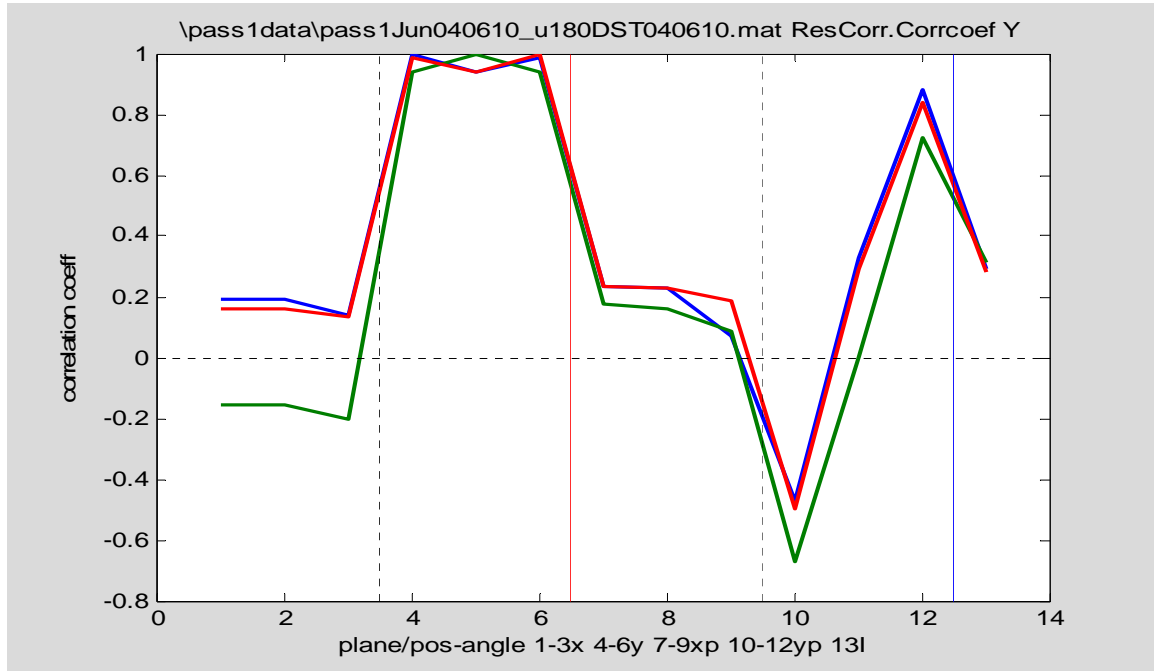


Figure 7 Correlation coefficient – y – for the cut data

```

%
plot(ResCorr.Corrcoef(:,7:9),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.Corrcoef XP'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;

```

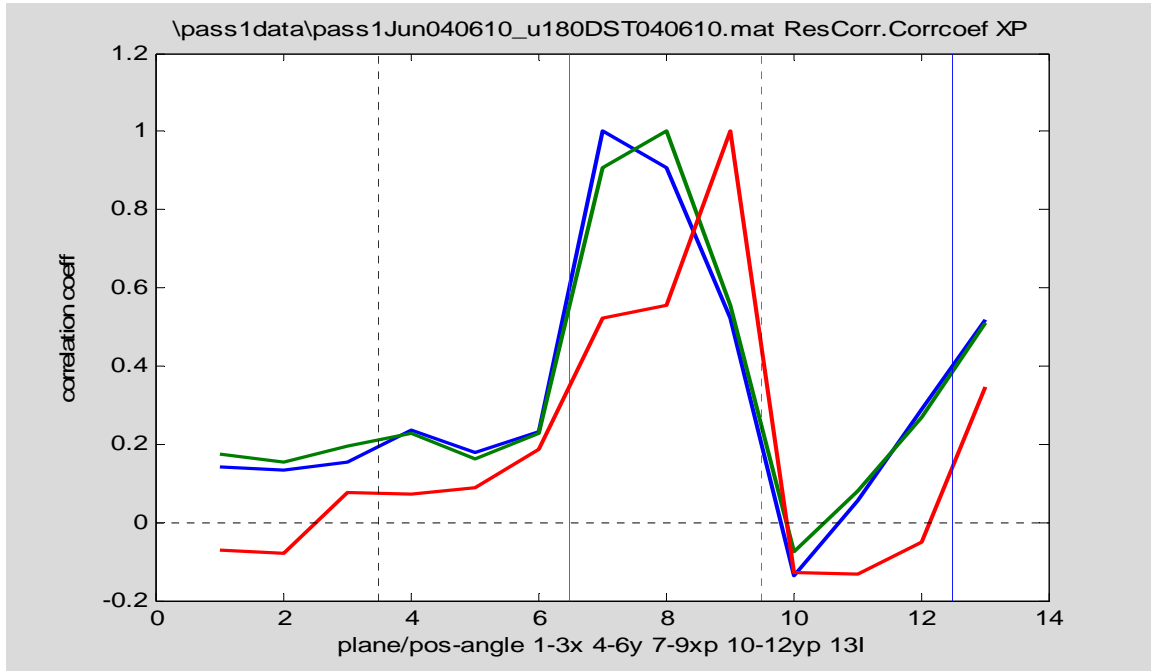


Figure 8 Correlation coefficient – x' – for the cut data

```

%
plot(ResCorr.Corrcoef(:,10:12),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.Corrcoef YP'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line;

```

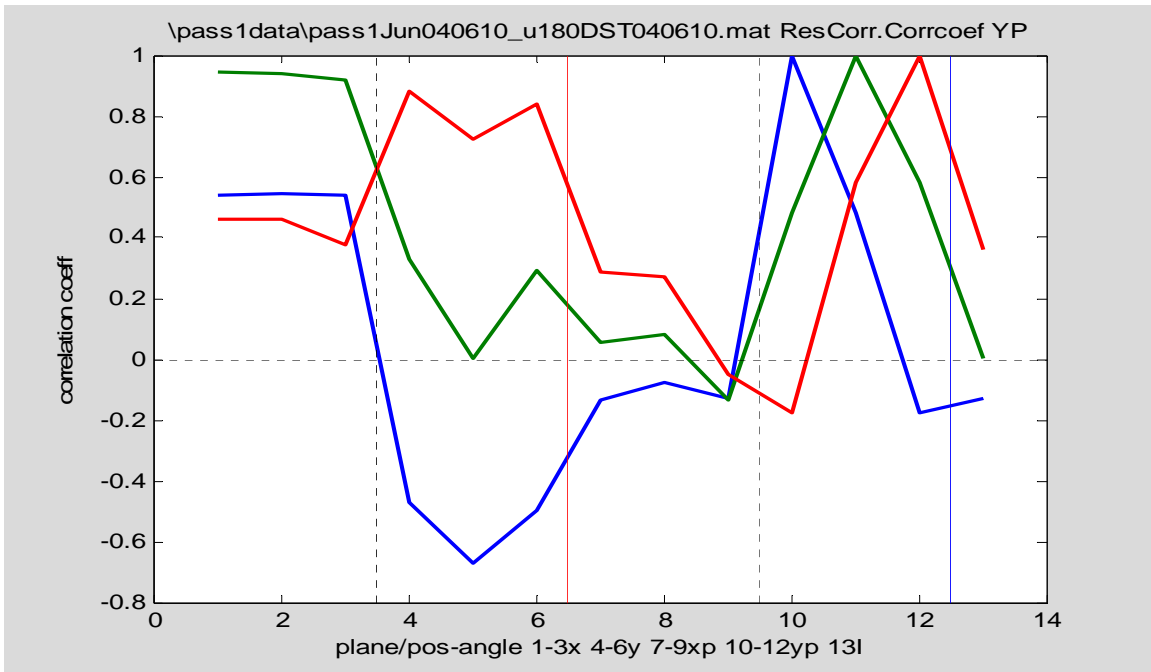


Figure 9 Correlation coefficient – y' – for the cut data

```
%
plot(ResCorr.Corrcoef(:,13),'LineWidth',2)
ver_line(3.5);ver_line(6.5,'r');ver_line(9.5);ver_line(12.5,'b');
title([fname ' ResCorr.Corrcoef I'],'Interpreter','none');
xlabel('plane/pos-angle 1-3x 4-6y 7-9xp 10-12yp
13I');ylabel('correlation coeff');
hor_line ;
```

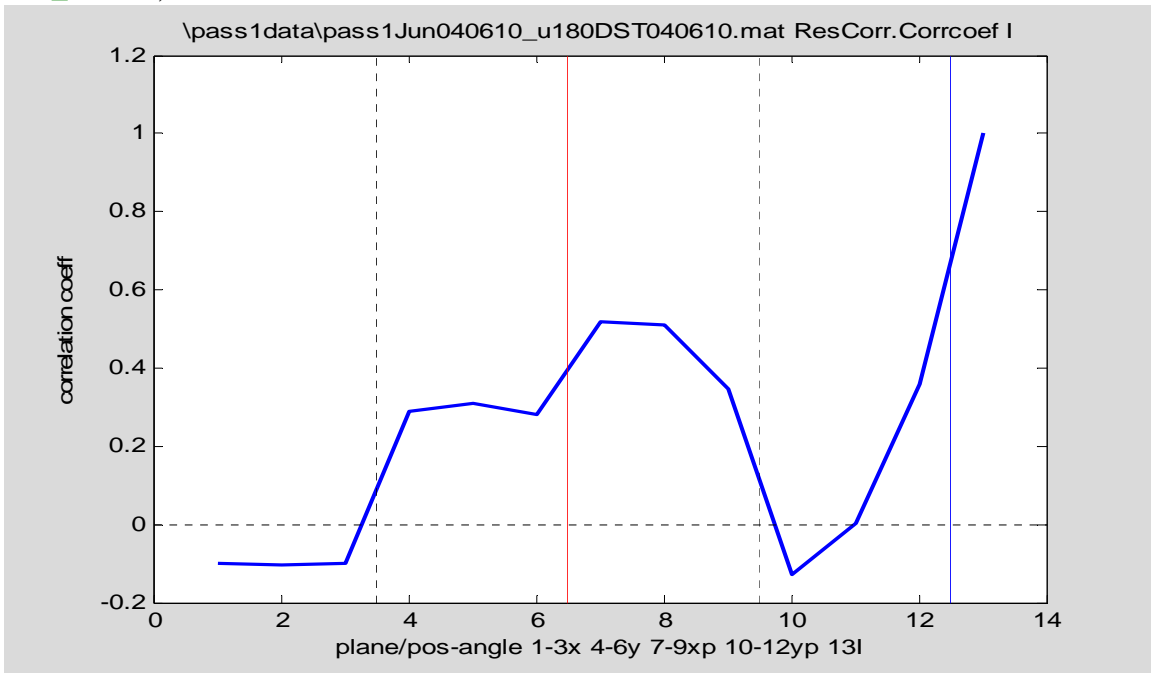


Figure 10 Correlation coefficient – I – for the cut data

%
 The next 4 figures (11 -14 x y x' y') show the bundles of rays – similar to the FFTB plot, but without correction for the offsets. As above, there is clearly a problem with the angles.

%plot the bundles - cut

%

```
plot(z,x(:,u));
ver_line(z(2));
title([fname ' cut x vs z'],'Interpreter','none')
xlabel('z mm');ylabel('x \mum');
```

%

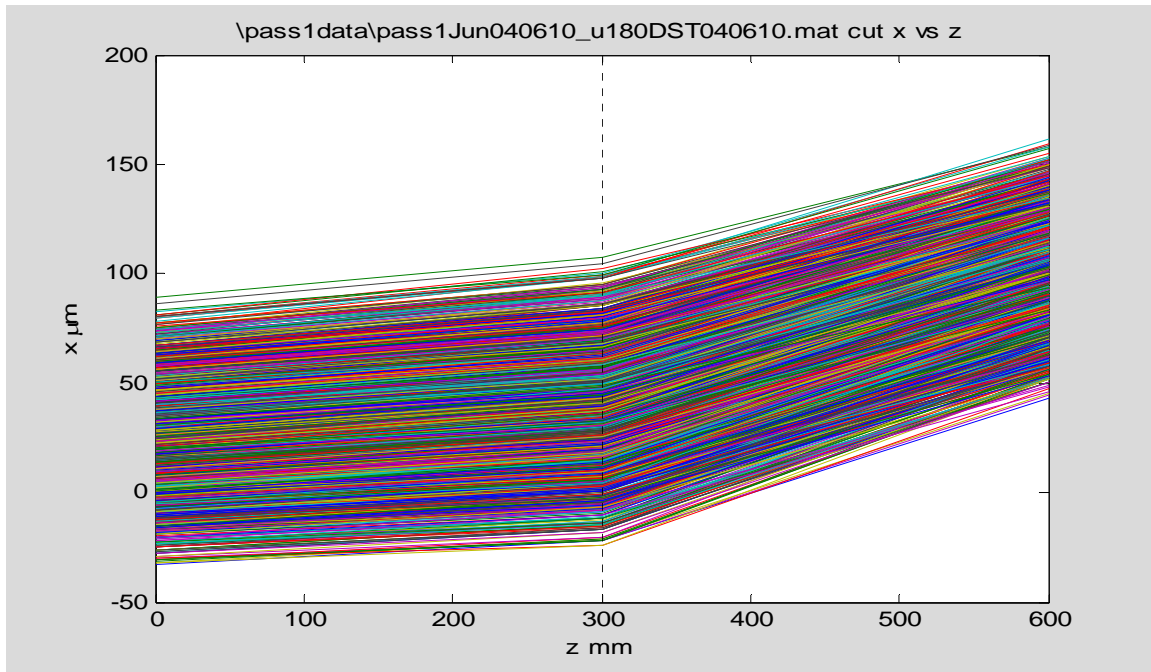


Figure 11 Ray bundle plot – cut data x

%

```
plot(z,y(:,u));
ver_line(z(2));
title([fname ' cut y vs z'],'Interpreter','none')
xlabel('z mm');ylabel('y \mum');
```

%%

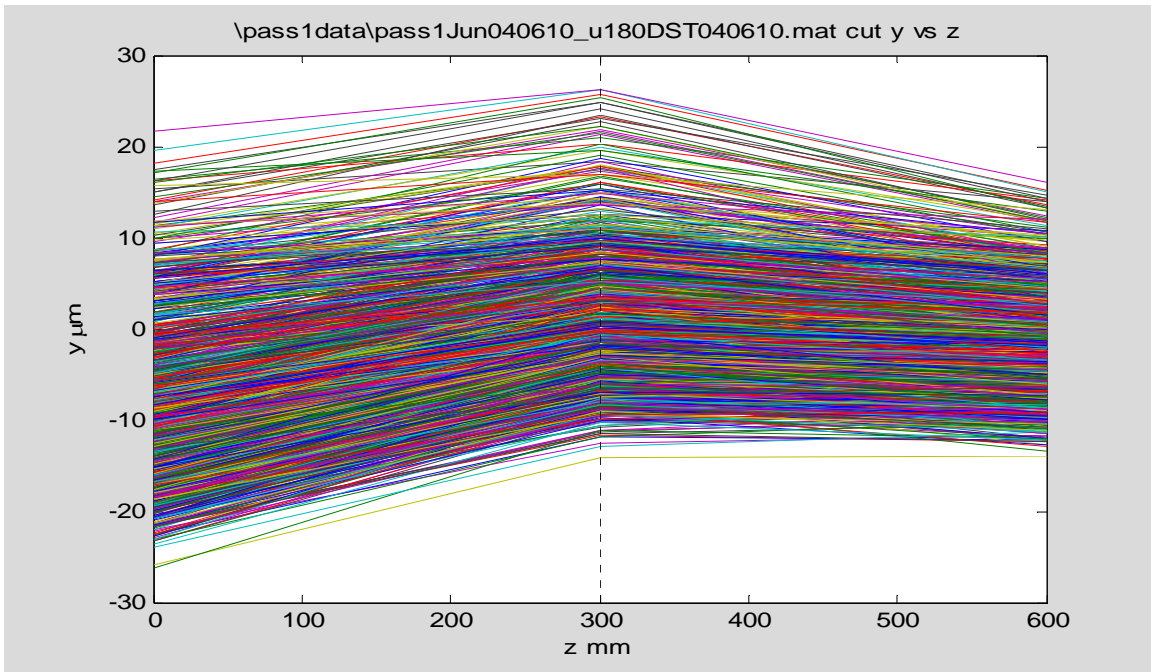


Figure 12 Ray bundle plot – cut data y

```

plot(z,xp(:,u));
ver_line(z(2));
title([fname ' cut xp vs z'],'Interpreter','none')
xlabel('z mm');ylabel('xp \mum');
%%

```

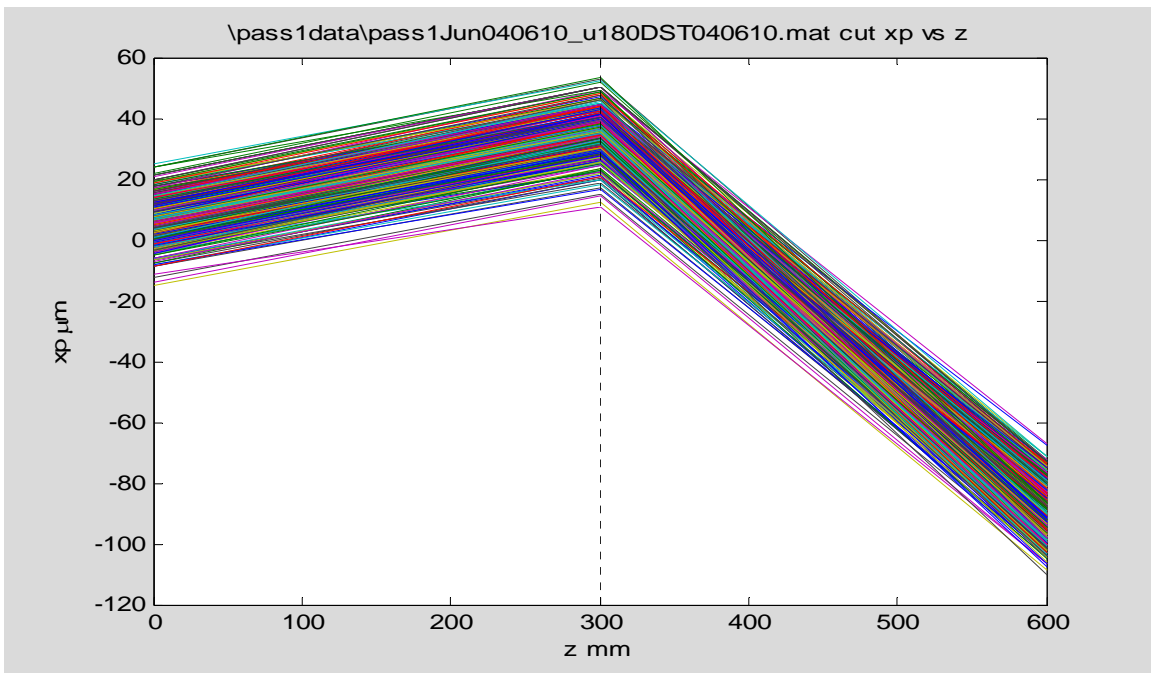


Figure 13 Ray bundle plot – cut data x'

```

plot(z,yp(:,u));
ver_line(z(2));
title([fname ' cut yp vs z'],'Interpreter','none')
xlabel('z mm');ylabel('yp \mum');
%
```

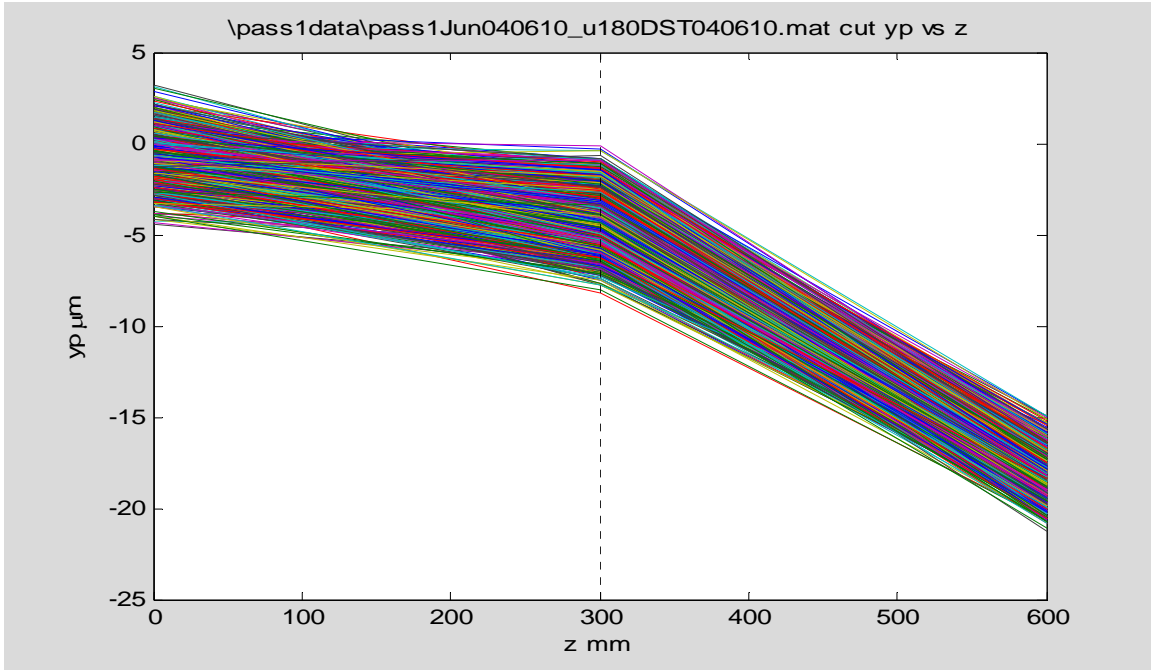


Figure 14 Ray bundle plot – cut data y'

```

%
%
hist(x(1,u),50);
title([fname ' x1 std=' num2str(std(x(1,u))) '
\mum'],'Interpreter','none');
xlabel('x \mum');
%
```

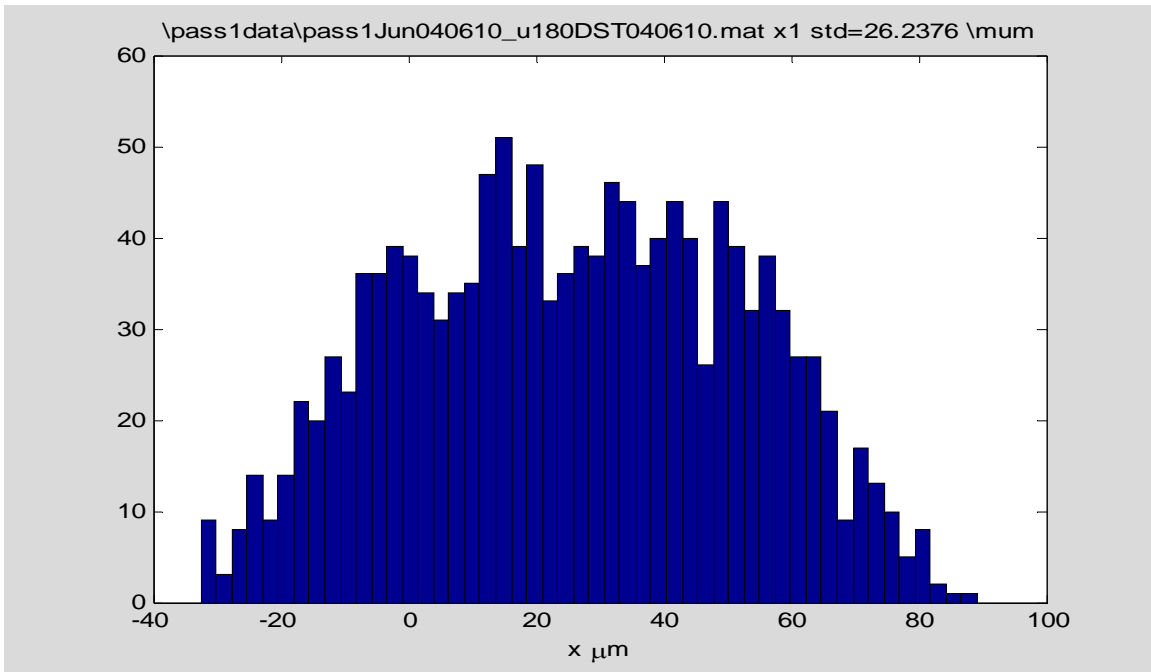


Figure 15 Histogram chan 1 x (cut) beam motion

```

%
hist(y(1,u),50);
title([fname ' y1 std=' num2str(std(y(1,u))) '
\mum'],'Interpreter','none');
xlabel('y \mum');

```

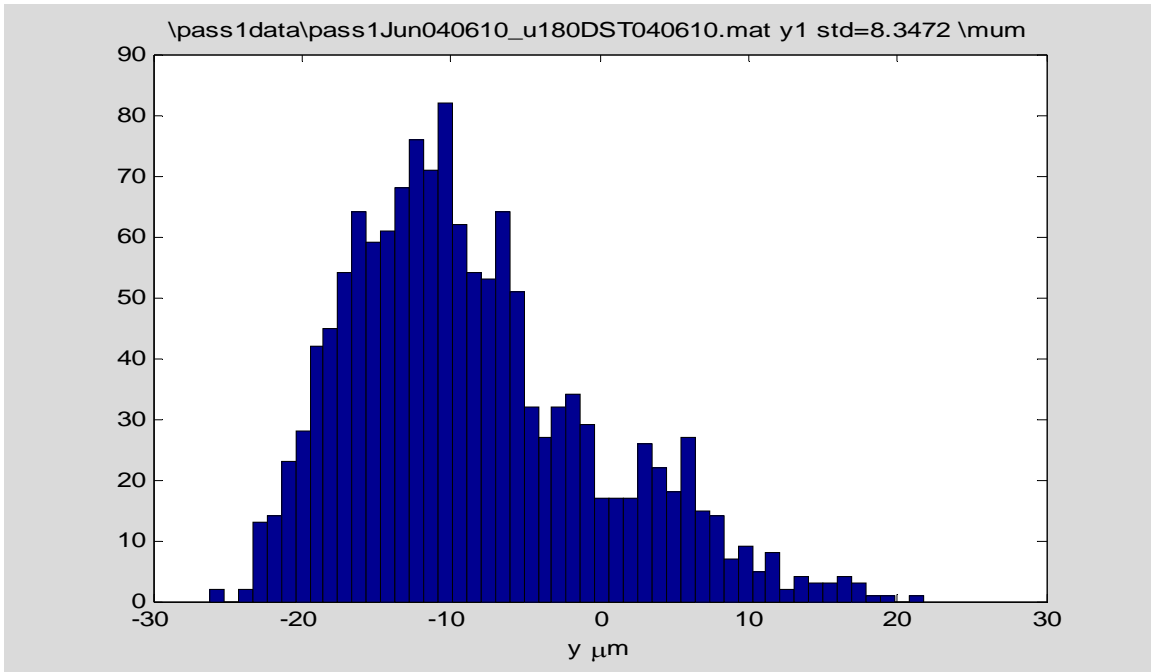


Figure 16 Histogram chan 1 y (cut) beam motion

```

%
```

```

hist(xp(1,u),50);
title([fname ' xp1 std=' num2str(std(xp(1,u))) '
\mum'],'Interpreter','none');
xlabel('xp \mum');
%

```

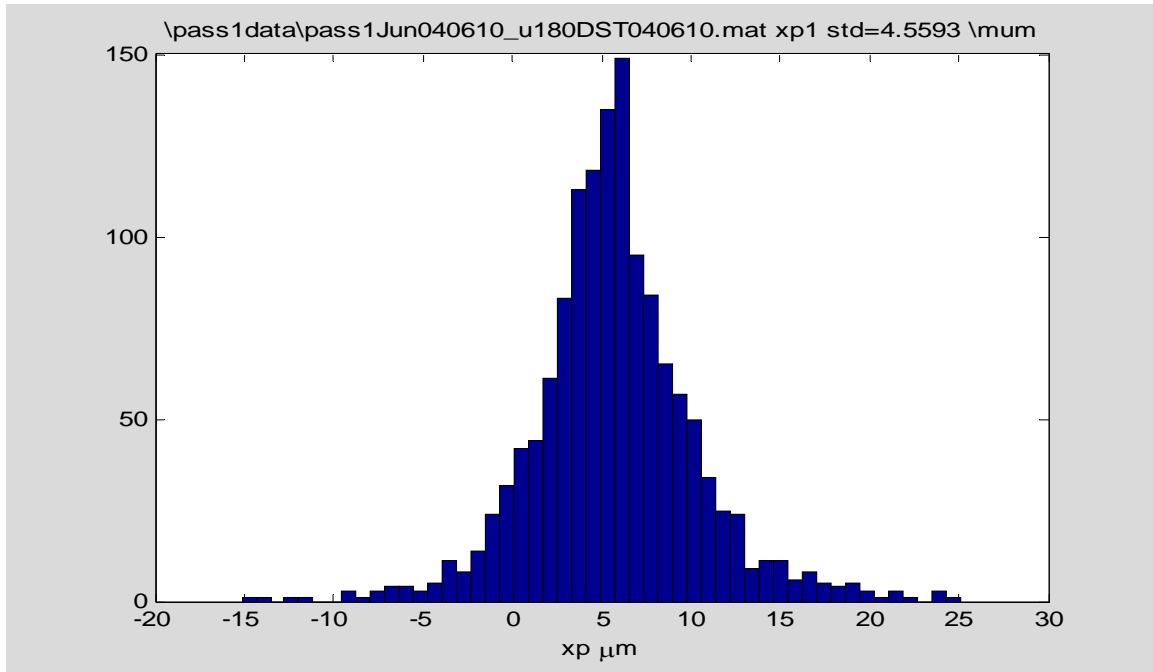


Figure 17 Histogram chan 1 x' (cut) beam motion. The calibration is unknown but is close to the projected dipole over the cm gap ($5\mu\text{m} \rightarrow 0.5\text{mrad}$!)

```

%
hist(yp(1,u),50);
title([fname ' yp1 std=' num2str(std(yp(1,u))) '
\mum'],'Interpreter','none');
xlabel('yp \mum');
%

```

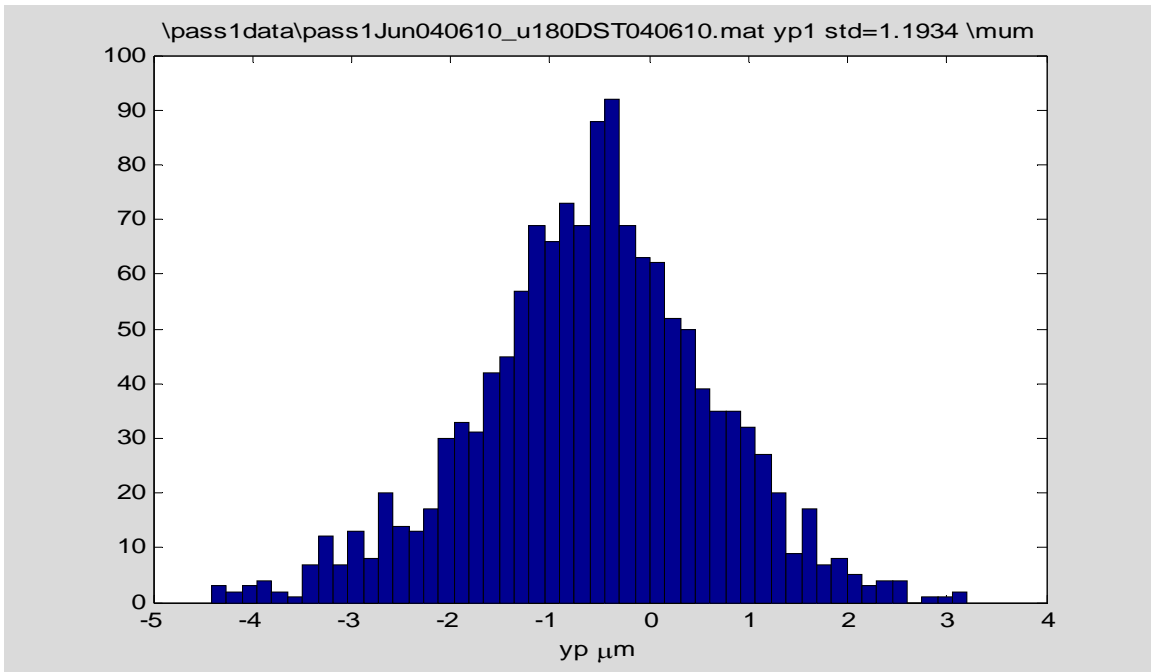


Figure 18 chan 1 x' (cut) beam motion. The calibration is unknown but is close to the projected dipole over the cm gap (5um \rightarrow 0.5mrad!)

The figures that follow are the time histories of the raw (cut) data – figure 19 through 30. The instability due to the kicker is easy to see.

```

plot(x(1,u));
title([fname ' x1 vs cut pulse#'],'Interpreter','none');
xlabel('pulse #');ylabel('x1 \mum');

```

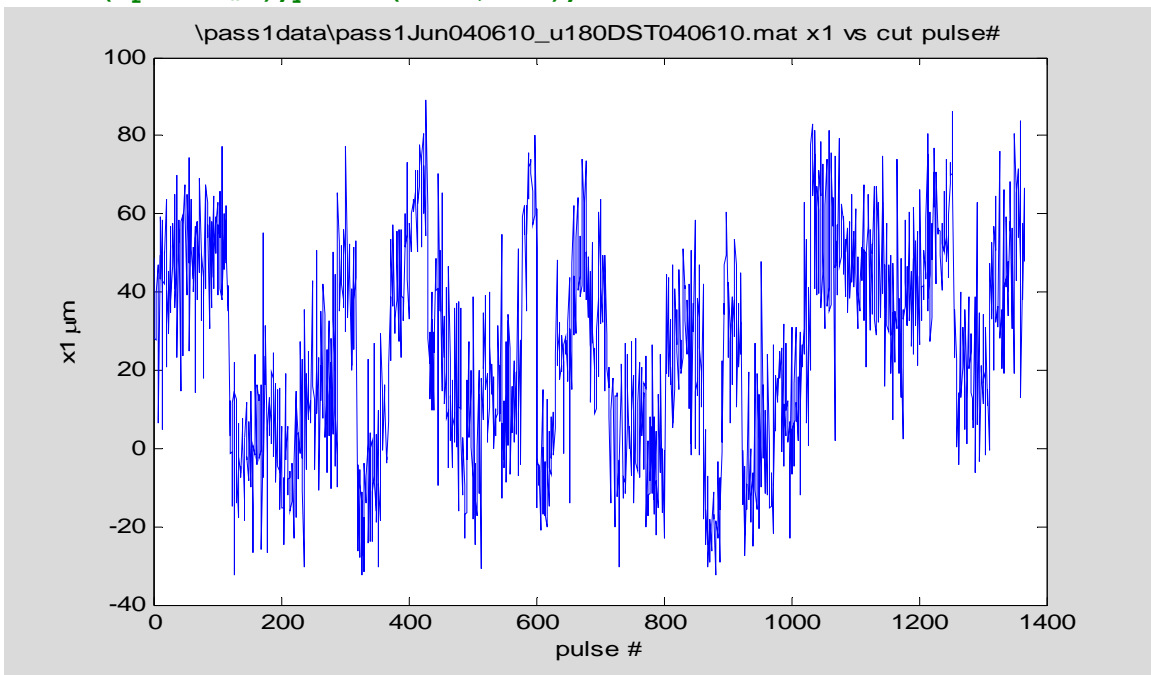


Figure 19

```
plot(x(2,u));  
title([fname ' x2 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('x2 \mum');
```

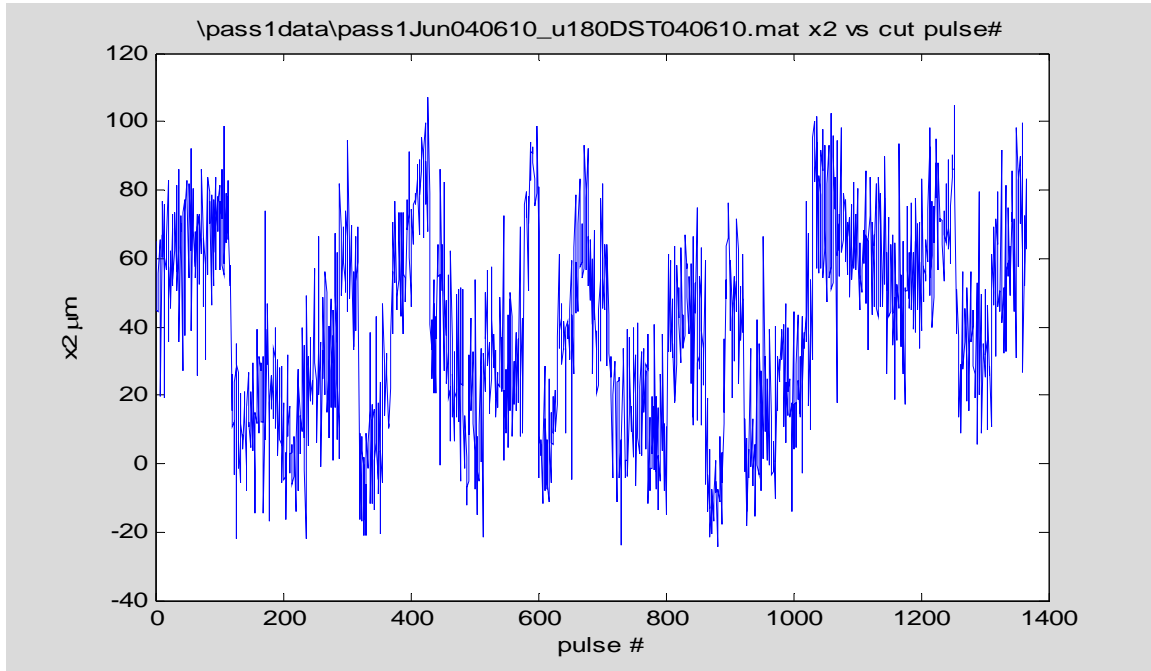


Figure 20

```
plot(x(3,u));  
title([fname ' x3 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('x3 \mum');
```

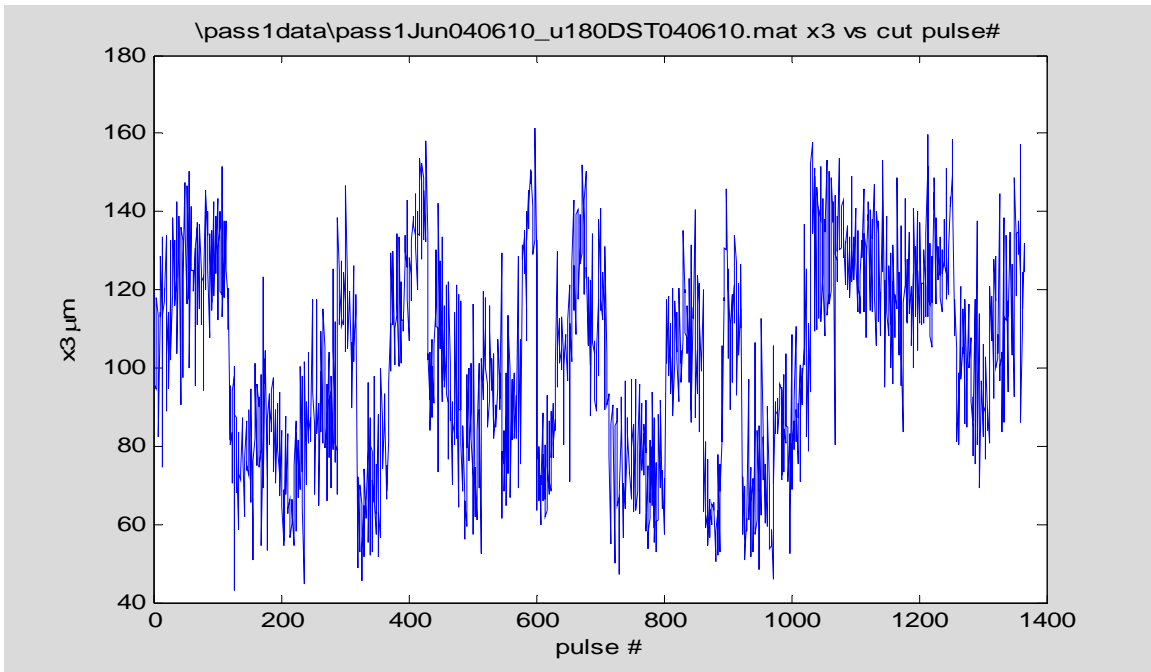


Figure 21

```
plot(y(1,u));  
title([fname ' y1 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('y1 \mum');
```

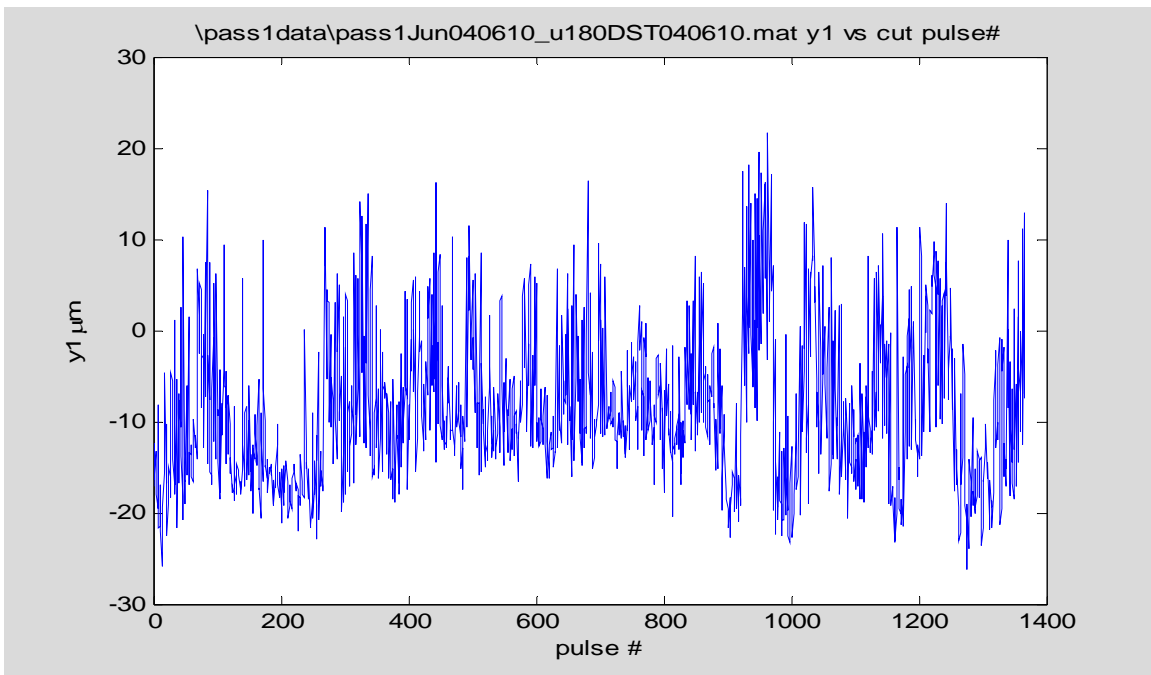


Figure 22

```
plot(y(2,u));
```

```
title([fname ' y2 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('y2 \mum');
```

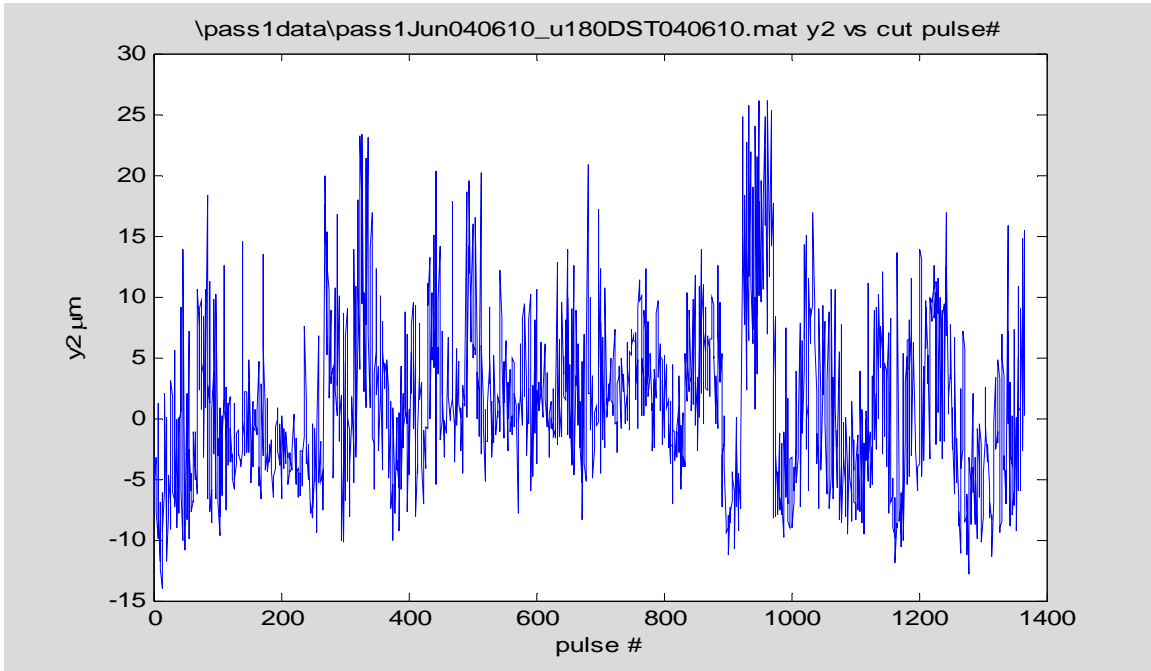


Figure 23

```
plot(y(3,u));  
title([fname ' y3 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('y3 \mum');
```

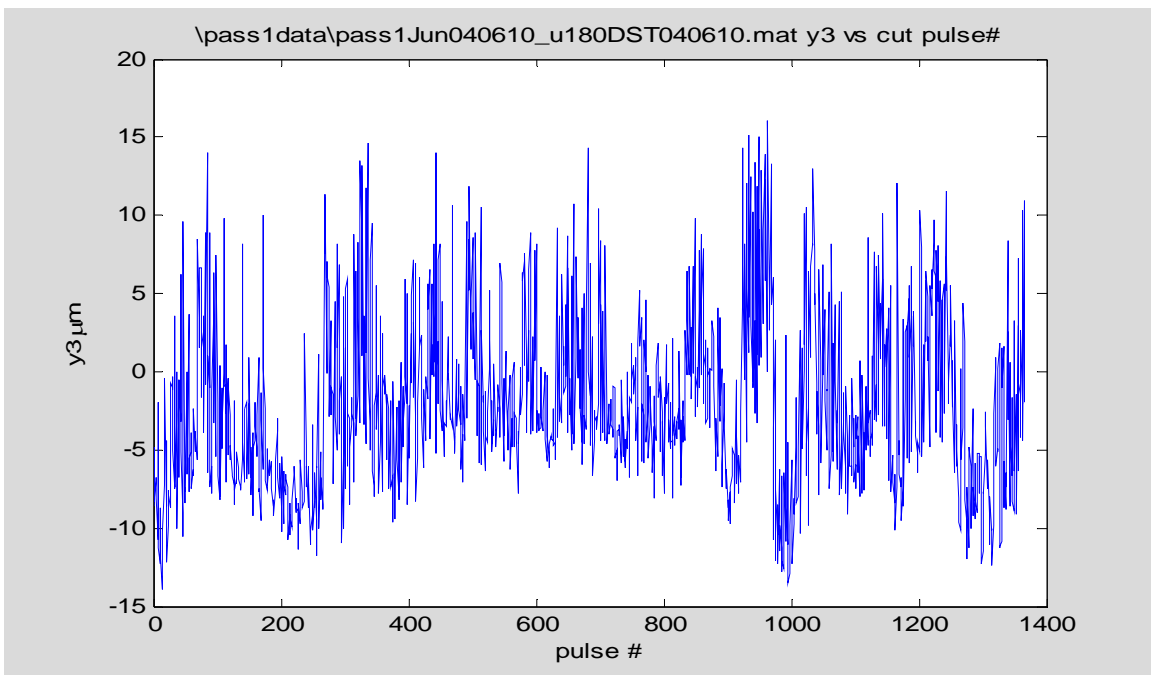


Figure 24

```
plot(xp(1,u));  
title([fname ' xp1 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('xp1 \mum');
```

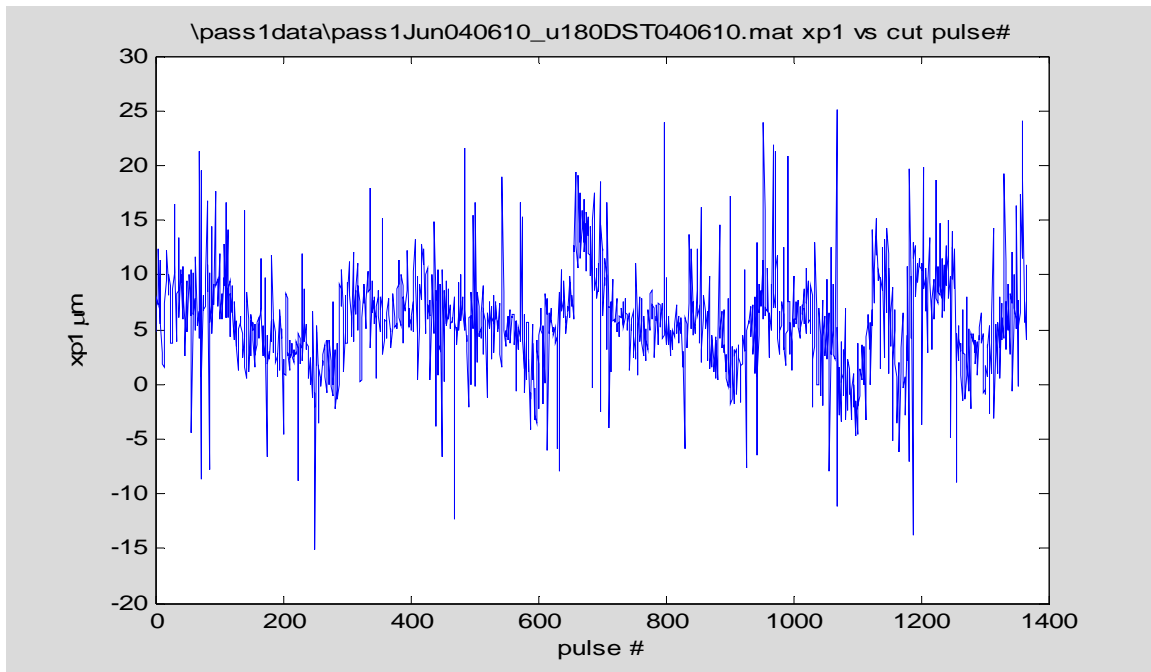


Figure 25

```
plot(xp(2,u));  
title([fname ' xp2 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('xp2 \mum');
```

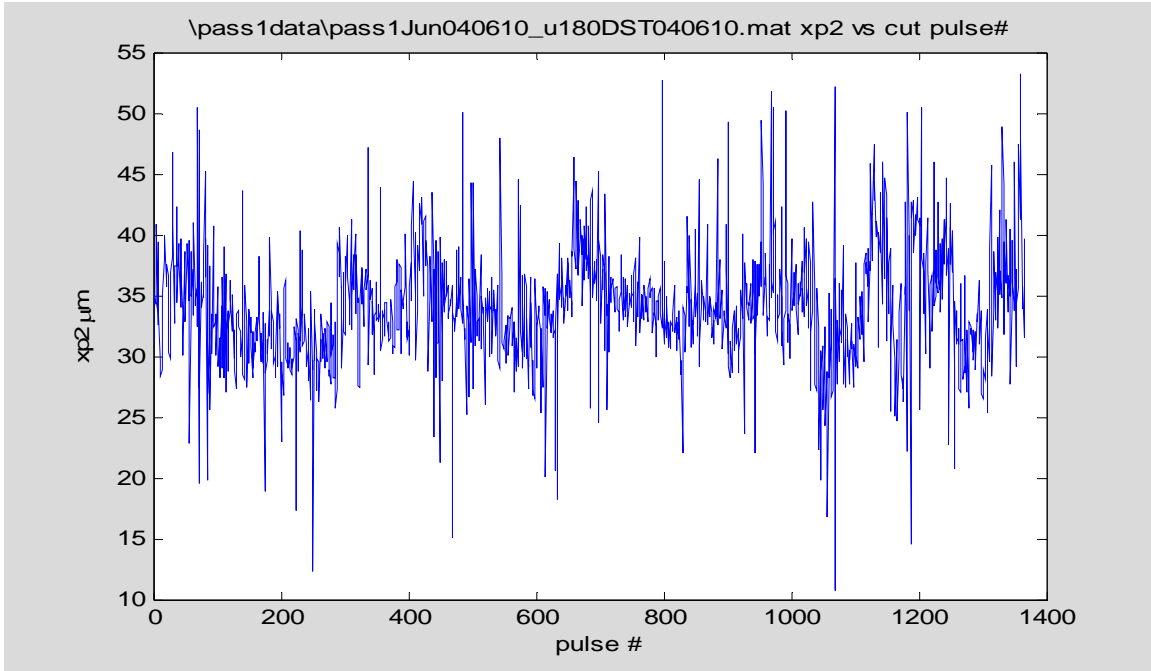


Figure 26

```
plot(xp(3,u));
title([fname ' xp3 vs cut pulse#'],'Interpreter','none');
xlabel('pulse #');ylabel('xp3 \mum');
```

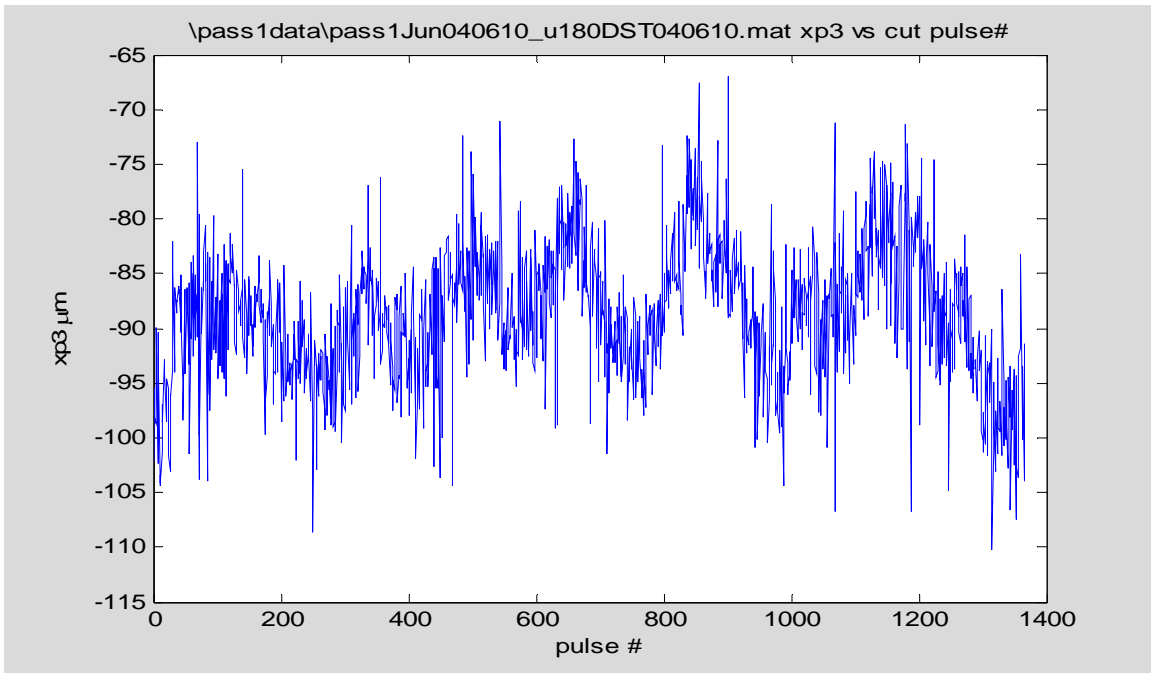


Figure 27

```
plot(yp(1,u));
```

```
title([fname ' yp1 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('yp1 \mum');
```

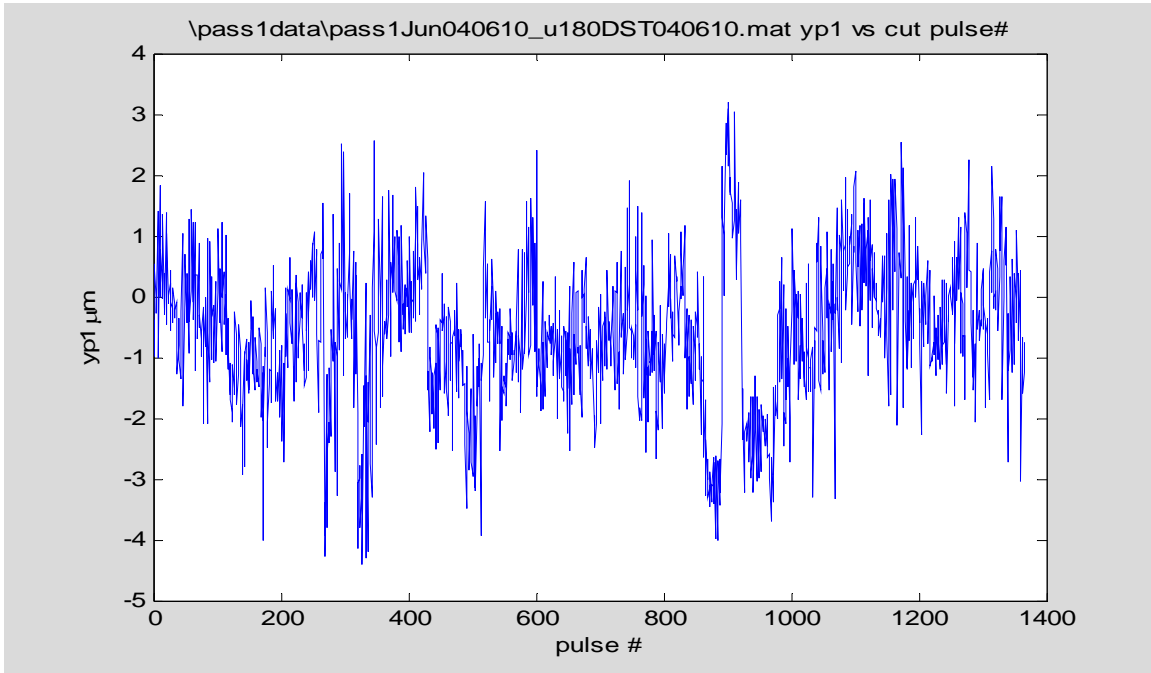


Figure 28

```
plot(yp(2,u));  
title([fname ' yp2 vs cut pulse#'],'Interpreter','none');  
xlabel('pulse #');ylabel('yp2 \mum');
```

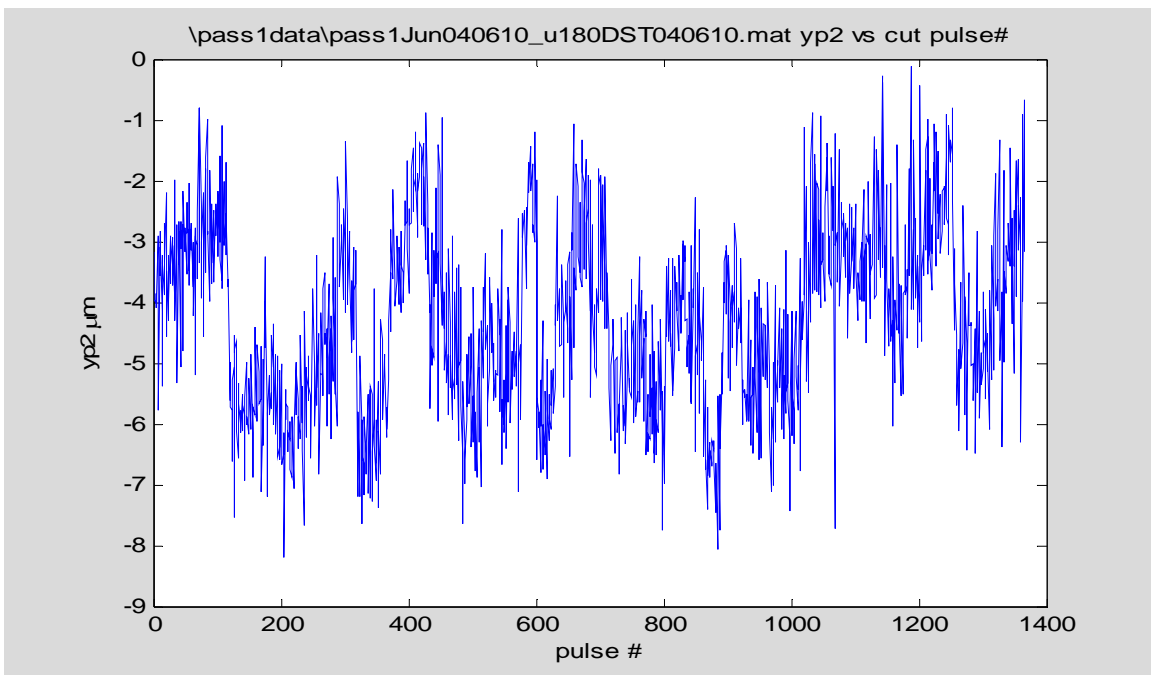


Figure 29

```

plot(yp3,u);
title([fname ' yp3 vs cut pulse#'],'Interpreter','none');
xlabel('pulse #');ylabel('yp3 \mum');

```

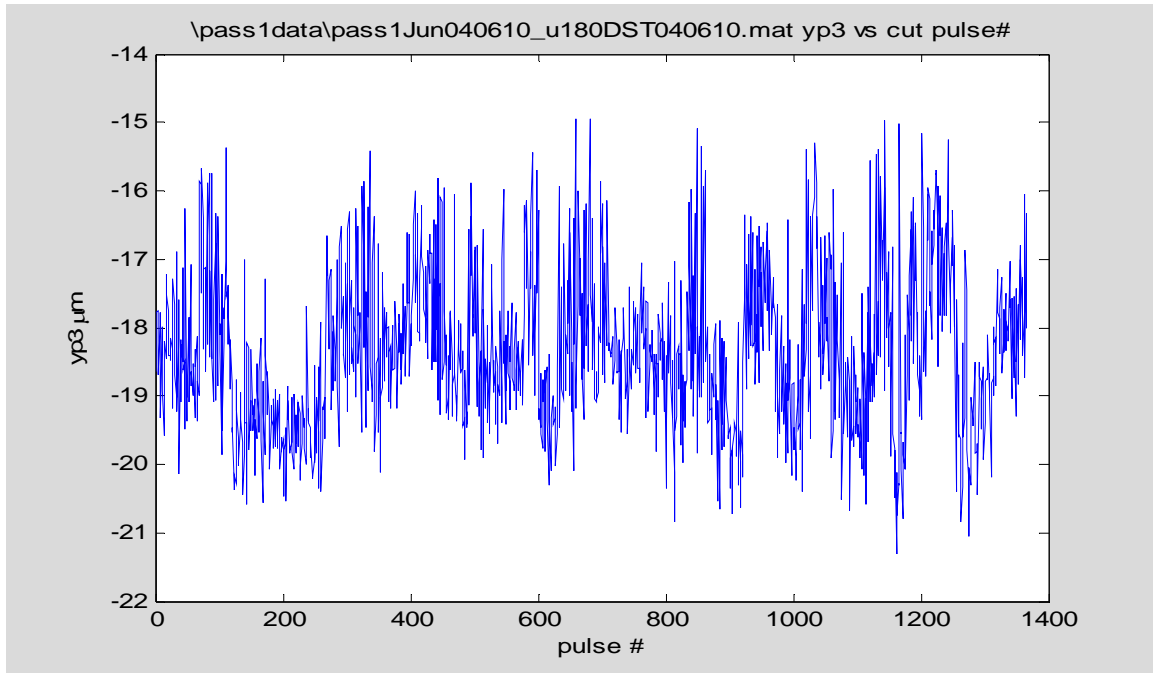


Figure 30

%residuals from the fit vs pulse number

The next 12 figures are the residuals, after regression, for each one (x y x' y') taken in turn. The rms is shown at the top right of the figure.

```

plot(ResCorr.LLresidual(:,1))
title([fname ' LLresidual x1; std='
num2str(ResCorr.LLresidualStd(1))'],'Interpreter','none');
xlabel('pulse #');ylabel('x1 \mum');

```

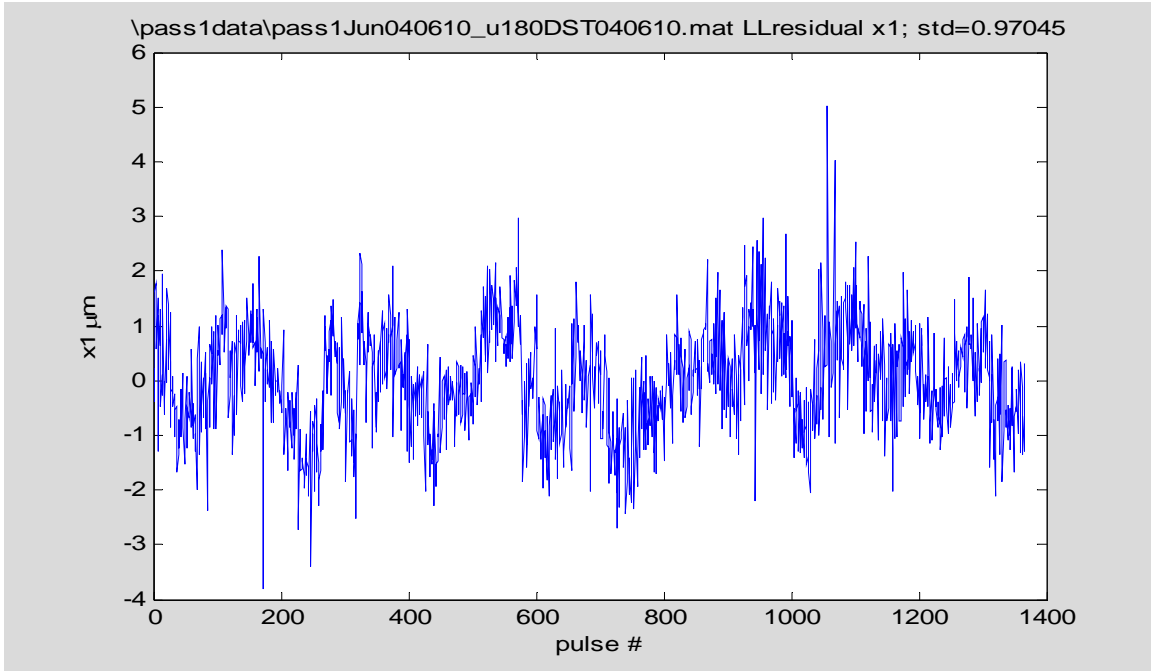


Figure 31

```
%
plot(ResCorr.LLresidual(:,2))
title([fname ' LLresidual x2; std='
num2str(ResCorr.LLresidualStd(2))], 'Interpreter', 'none');
xlabel('pulse #');ylabel('x2 \mum');
%
```

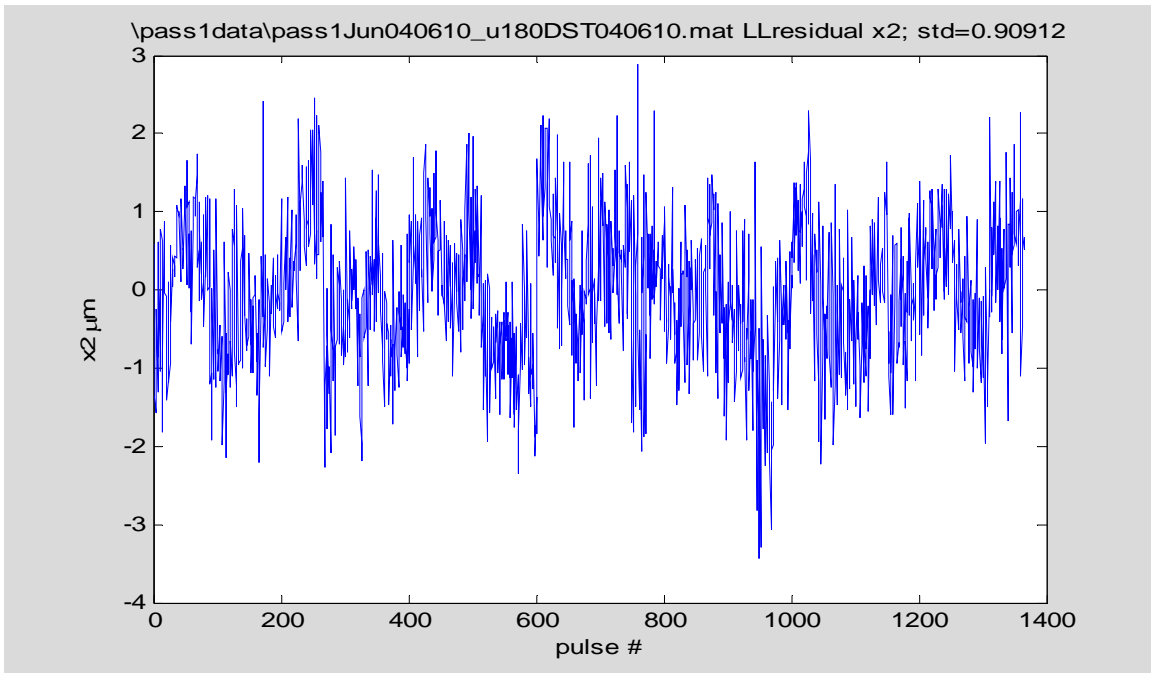


Figure 32

```

plot(ResCorr.LLresidual(:,3))
title([fname ' LLresidual x3; std='
num2str(ResCorr.LLresidualStd(3))],'Interpreter','none');
xlabel('pulse #');ylabel('x3 \mum');
%
```

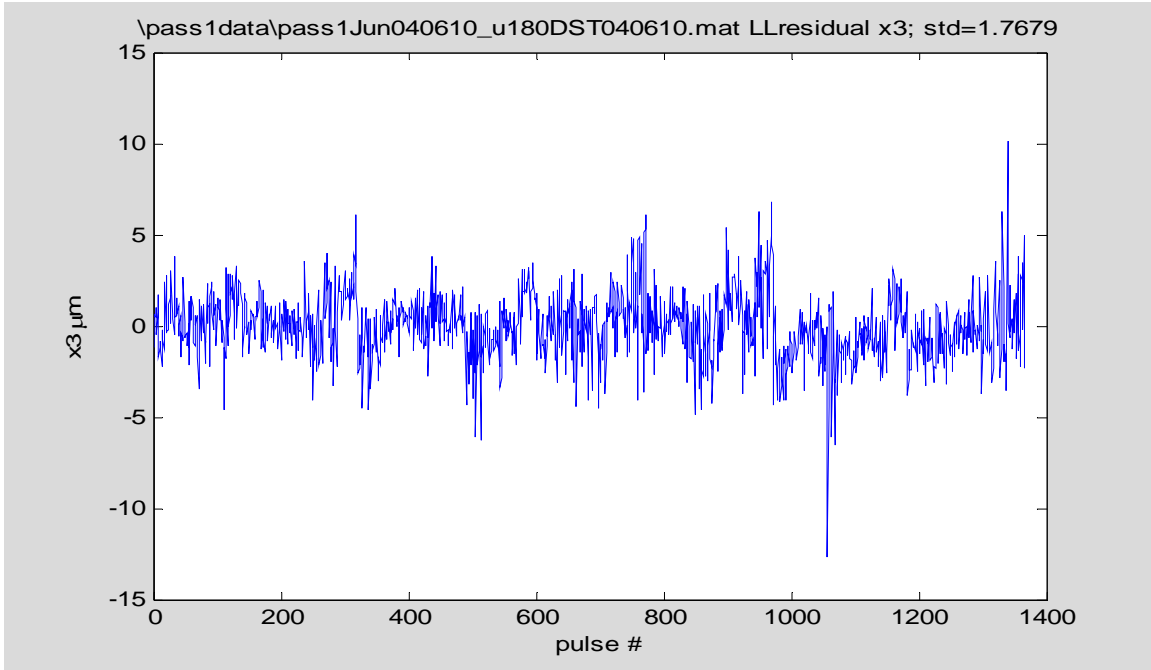


Figure 33

```

plot(ResCorr.LLresidual(:,4))
title([fname ' LLresidual y1; std='
num2str(ResCorr.LLresidualStd(4))],'Interpreter','none');
xlabel('pulse #');ylabel('y1 \mum');
```

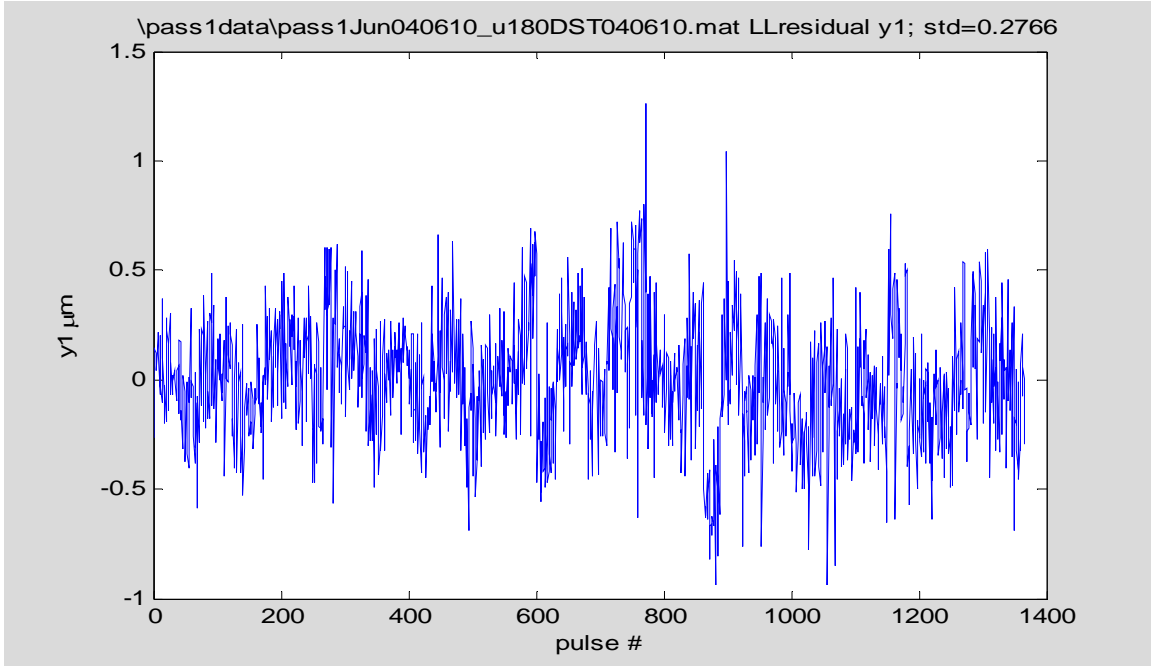


Figure 34

```
%  
plot(ResCorr.LLresidual(:,5))  
title([fname ' LLresidual y2; std='  
num2str(ResCorr.LLresidualStd(5))], 'Interpreter', 'none');  
xlabel('pulse #');ylabel('y2 \mum');
```

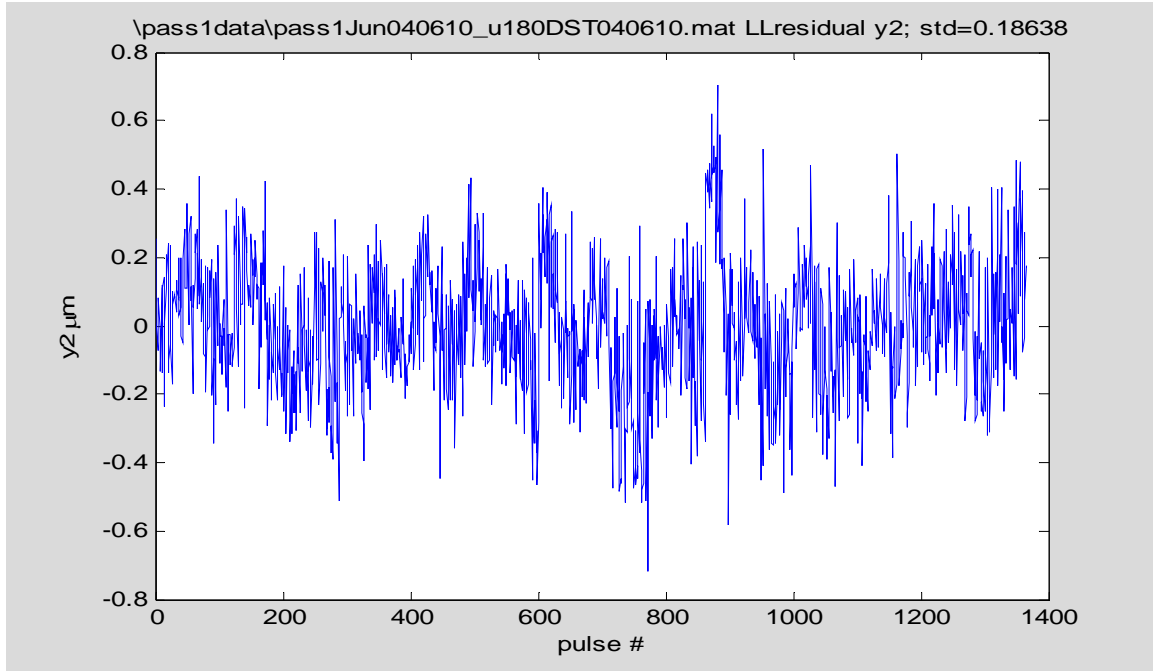


Figure 35

```
%  
plot(ResCorr.LLresidual(:,6))  
title([fname ' LLresidual y3; std='  
num2str(ResCorr.LLresidualStd(6))], 'Interpreter', 'none');  
xlabel('pulse #');ylabel('y3 \mum');  
%
```

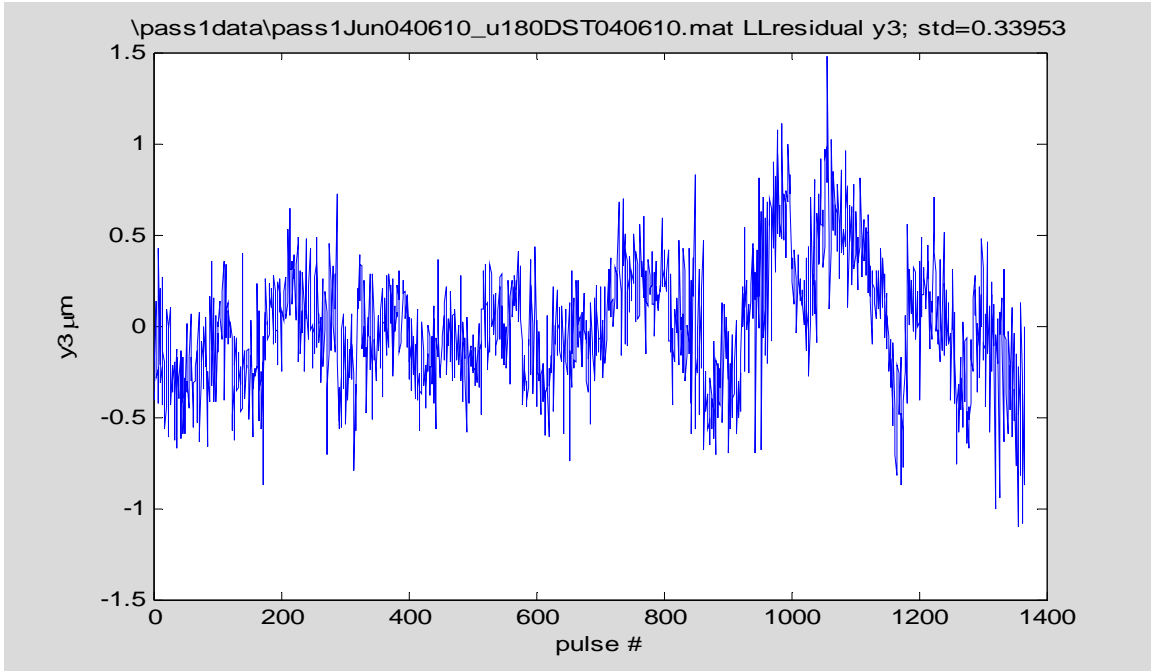


Figure 36

```

%
iang=6;
plot(ResCorr.LLresidual(:,iang+1))
title([fname ' LLresidual xp1; std='
num2str(ResCorr.LLresidualStd(iang+1))], 'Interpreter', 'none');
xlabel('pulse #');ylabel('xp1 \mum');

```

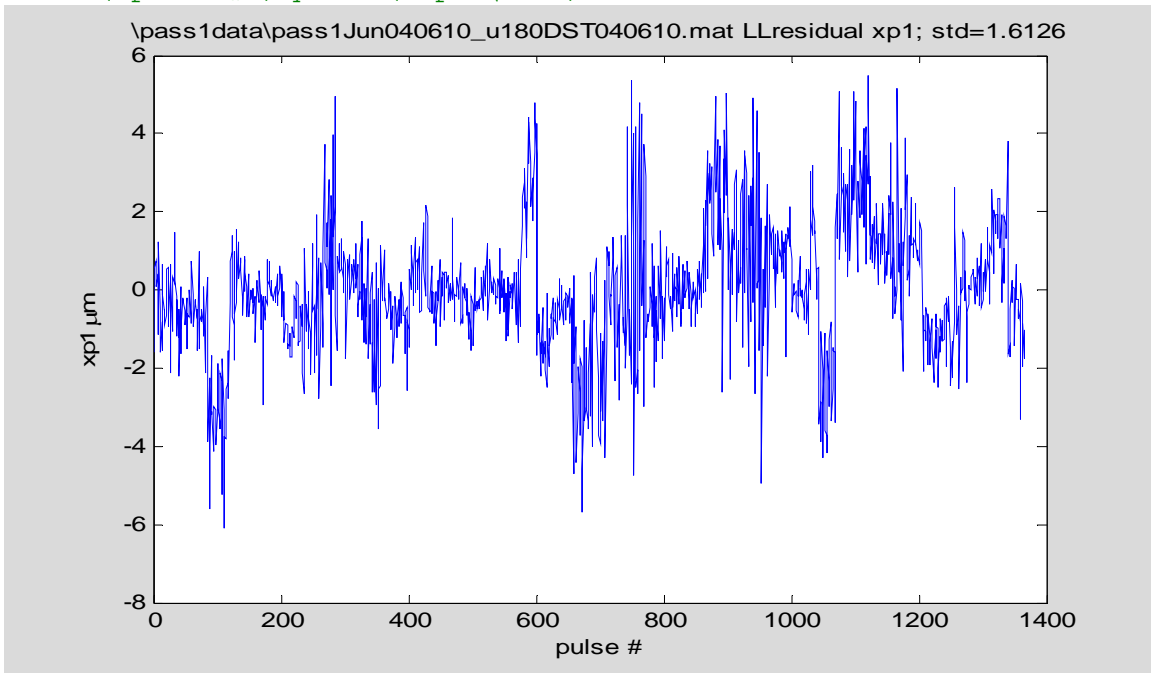


Figure 37

```

%
```

```

plot(ResCorr.LLresidual(:,iang+2))
title([fname ' LLresidual xp2; std='
num2str(ResCorr.LLresidualStd(iang+2))], 'Interpreter', 'none');
xlabel('pulse #'); ylabel('xp2 \mum');

```

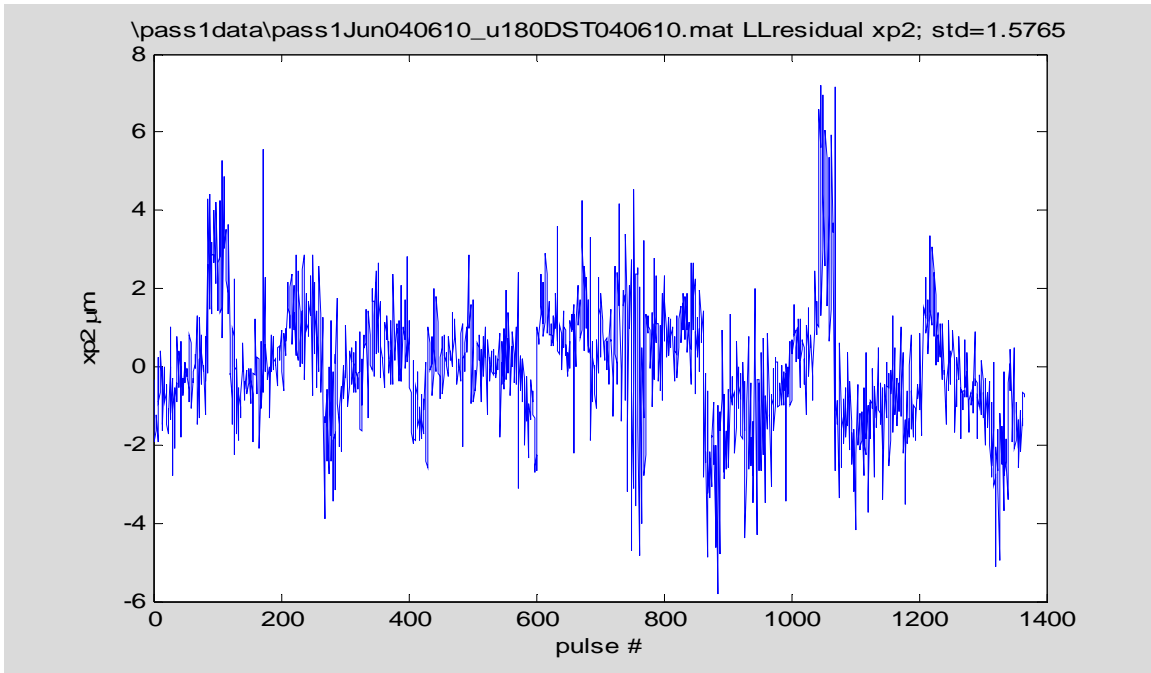


Figure 38

```

%
plot(ResCorr.LLresidual(:,iang+3))
title([fname ' LLresidual xp3; std='
num2str(ResCorr.LLresidualStd(iang+3))], 'Interpreter', 'none');
xlabel('pulse #'); ylabel('xp3 \mum');

```

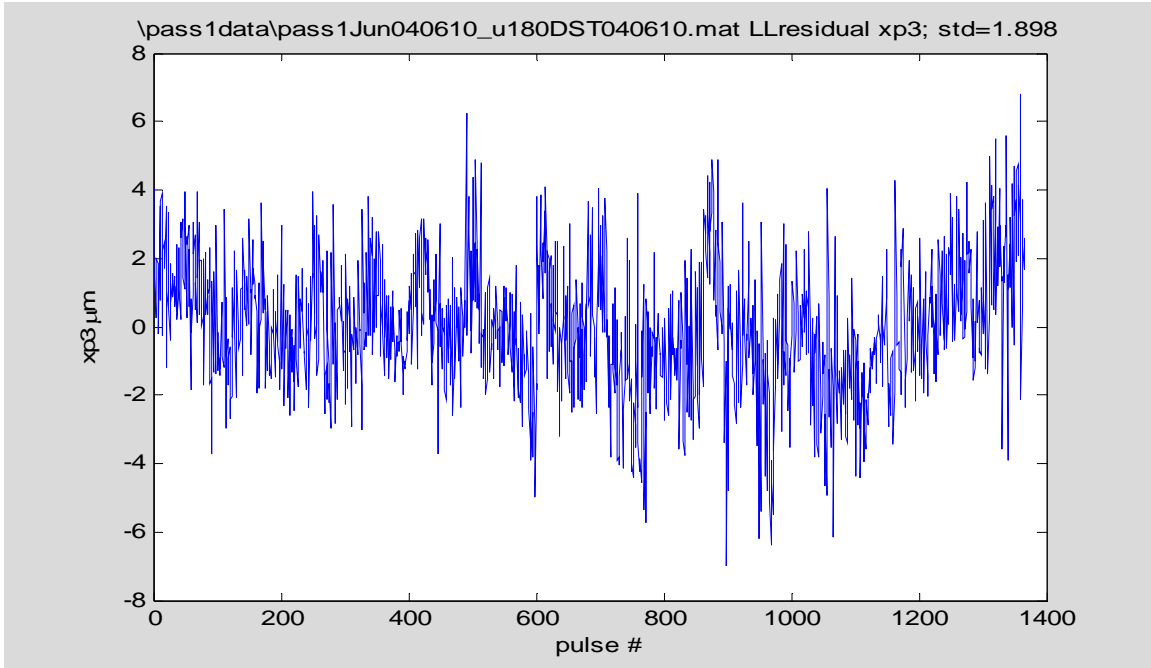


Figure 39

```

%
plot(ResCorr.LLresidual(:,iang+4))
title([fname ' LLresidual yp1; std='
num2str(ResCorr.LLresidualStd(iang+4))], 'Interpreter', 'none');
xlabel('pulse #');ylabel('yp1 \mum');
%

```

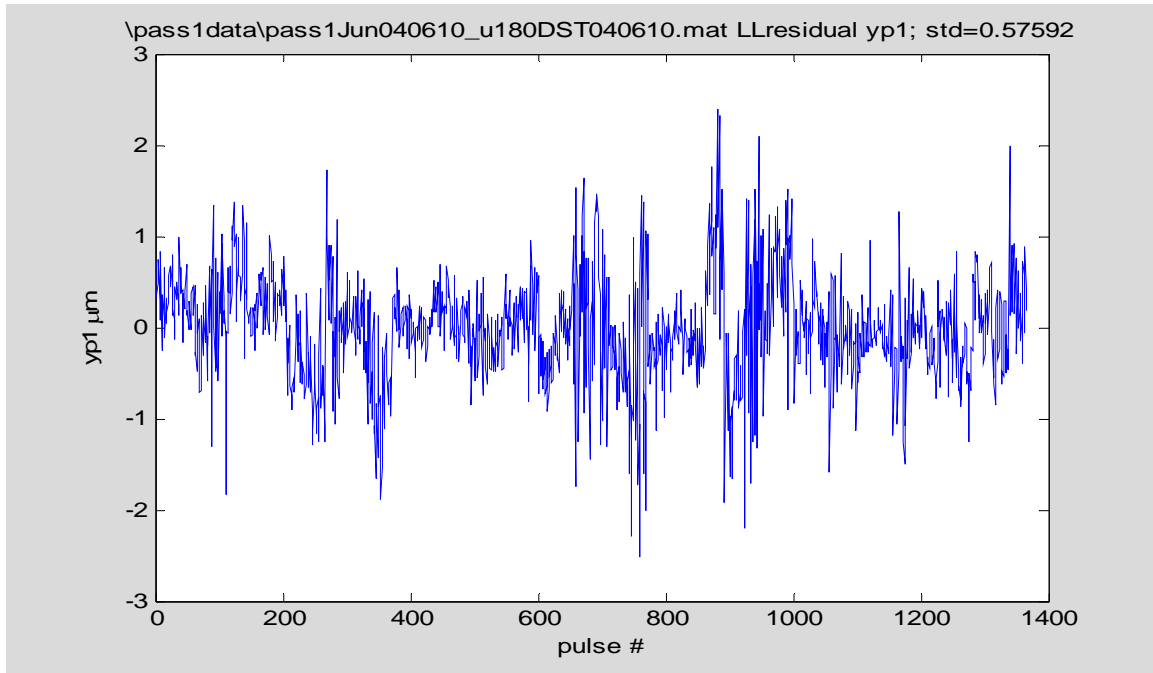


Figure 40

```

lot(ResCorr.LLresidual(:,iang+5))
title([fname ' LLresidual yp2; std='
num2str(ResCorr.LLresidualStd(iang+5))], 'Interpreter', 'none');
xlabel('pulse #');ylabel('yp2 \mum');
??? Undefined command/function 'lot'.
%
plot(ResCorr.LLresidual(:,iang+6))
title([fname ' LLresidual yp3; std='
num2str(ResCorr.LLresidualStd(iang+6))], 'Interpreter', 'none');
xlabel('pulse #');ylabel('yp3 \mum');

```

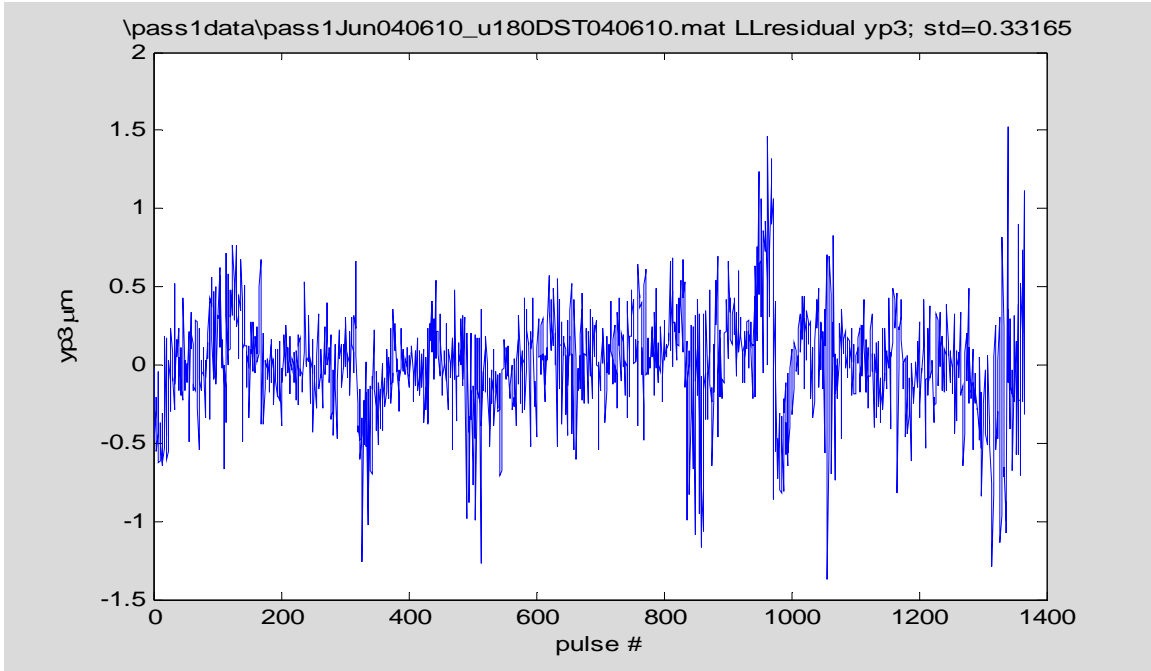


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