e+/e- vertical distribution comparison with flat and quadratic background

R. Holtzapple and J. Kern

A comparison of the vertical profiles from the e+ and e- PMT are made using the electron cloud witness bunch data from 4/2/2007. Two different fits to the vertical profiles are made:

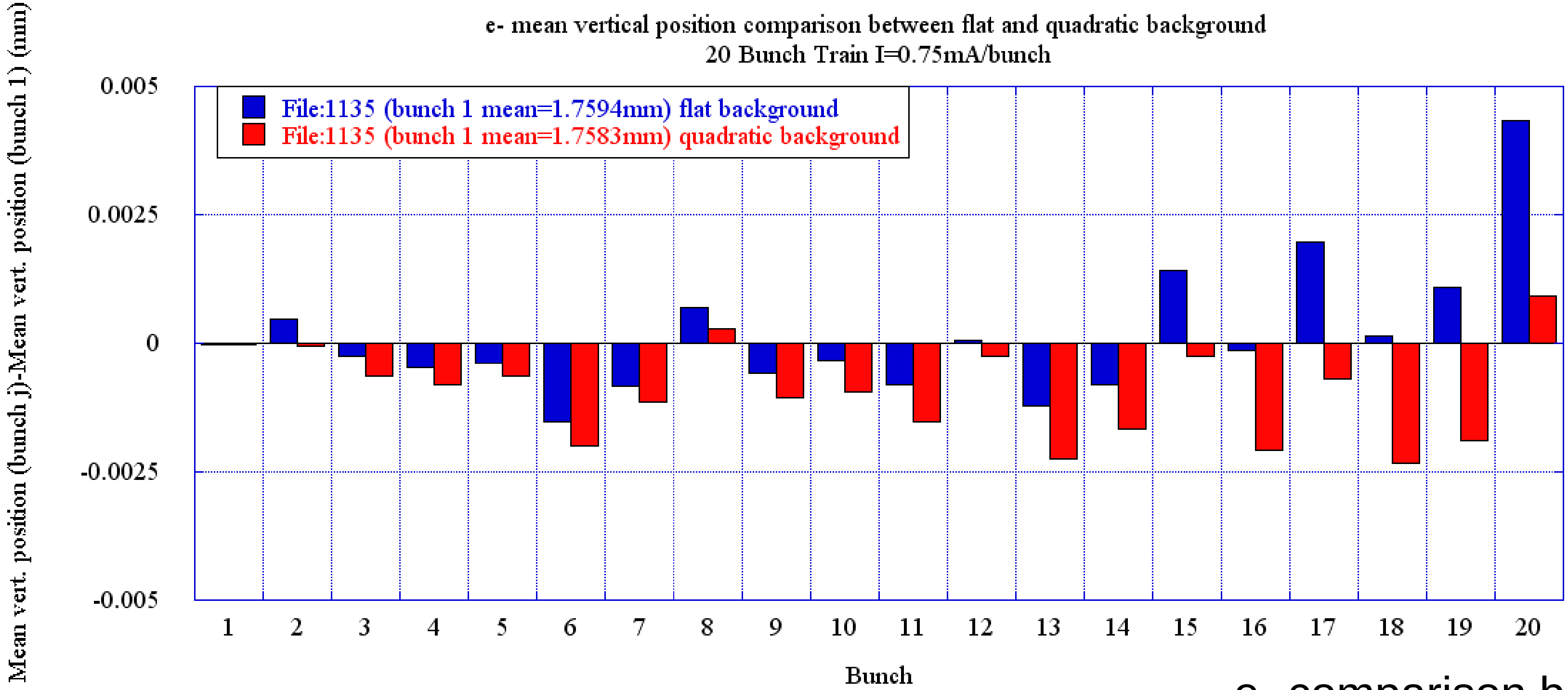
$$f_1(x) = A + D\exp\left(-\left(\frac{(x - E)}{\sqrt{2}F}\right)^2\right)$$

$$f_2(x) = A + Bx + Cx^2 + D\exp\left(-\left(\frac{(x - E)}{\sqrt{2}F}\right)^2\right)$$

f_1 is a fit to a Gaussian function with a flat background with fit parameters A, D, E, and F. f_2 is a fit to a Gaussian distribution with a quadratic background with fit parameters A-F. The statistic measure of how successful the fit is in explaining the variation of the data is by the square of the correlation between the data and the fit function (called R^2). R^2 is defined as:

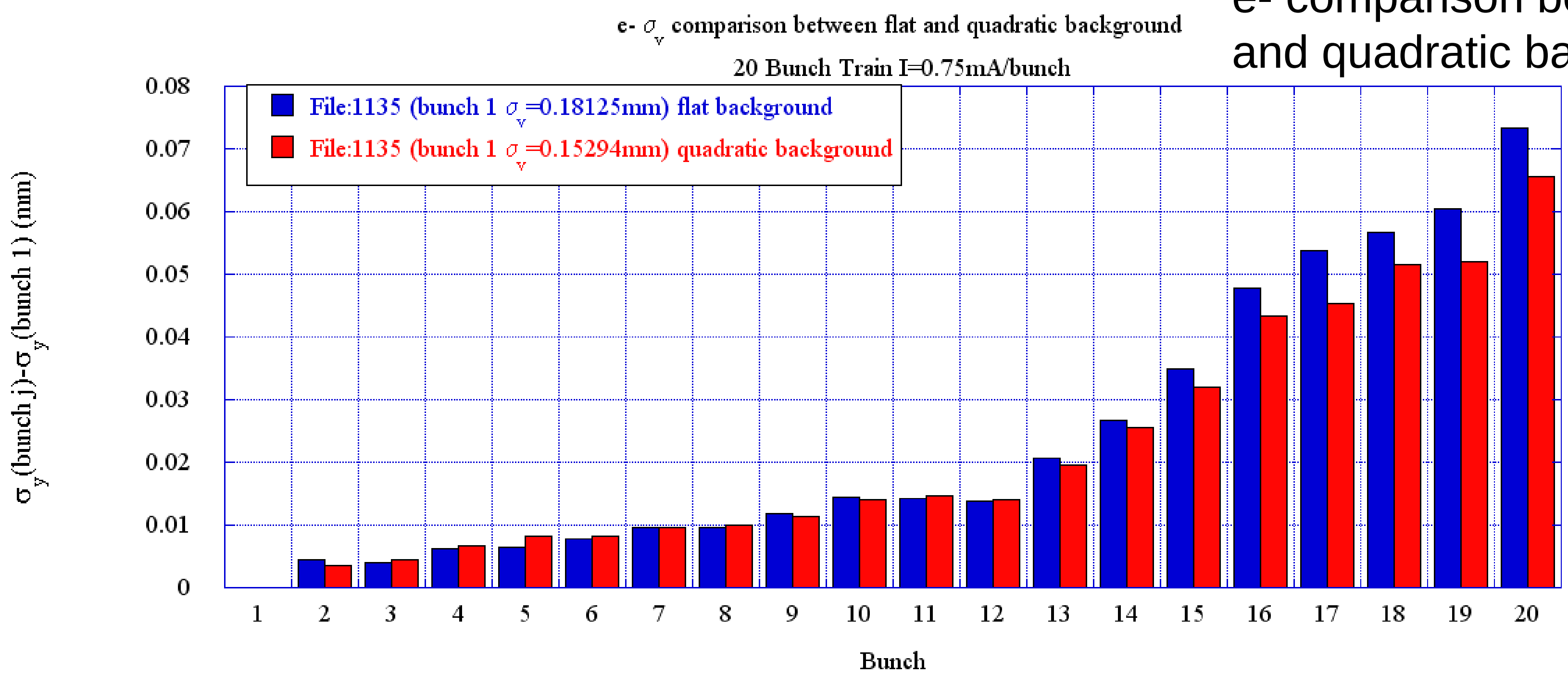
$$R^2 = 1 - \frac{\sum_{i=1}^{32} w_i \left(x_i - \hat{x}\right)^2}{\sum_{i=1}^{32} w_i \left(x_i - \overline{x}\right)^2}$$

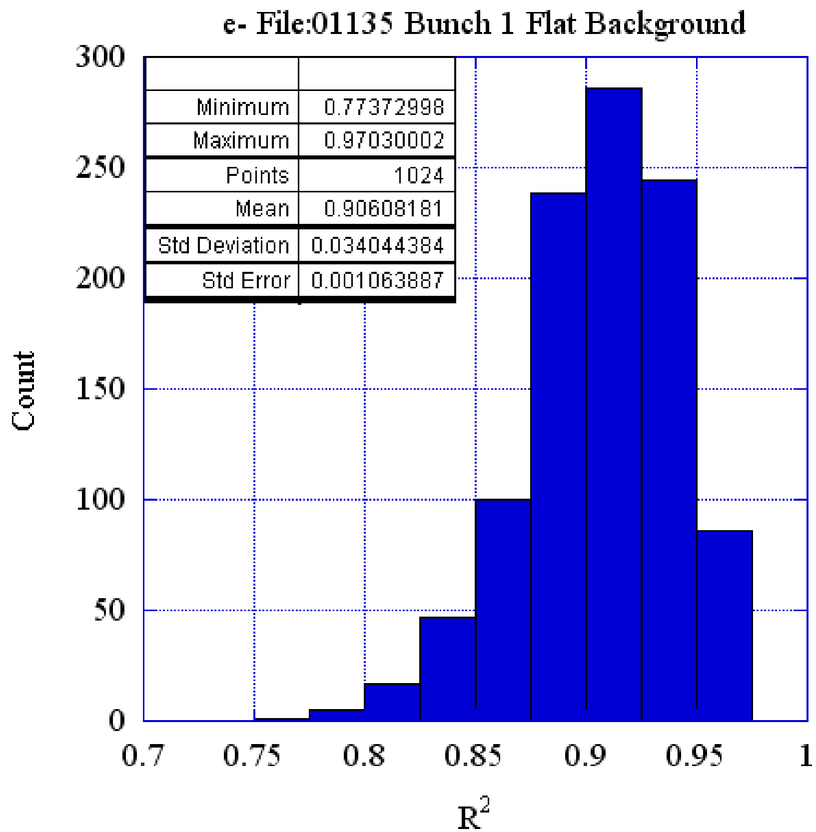
where w_i is the weight function, x_i is the data, $\hat{x}$ is the fitted value. R^2 can take on any value between 0 and 1, with a value closer to 1 indicating that a greater proportion of variance is accounted for by the model. An R^2 value of 0.8234 means that the fit explains 82.34% of the total variation in the data about the average.



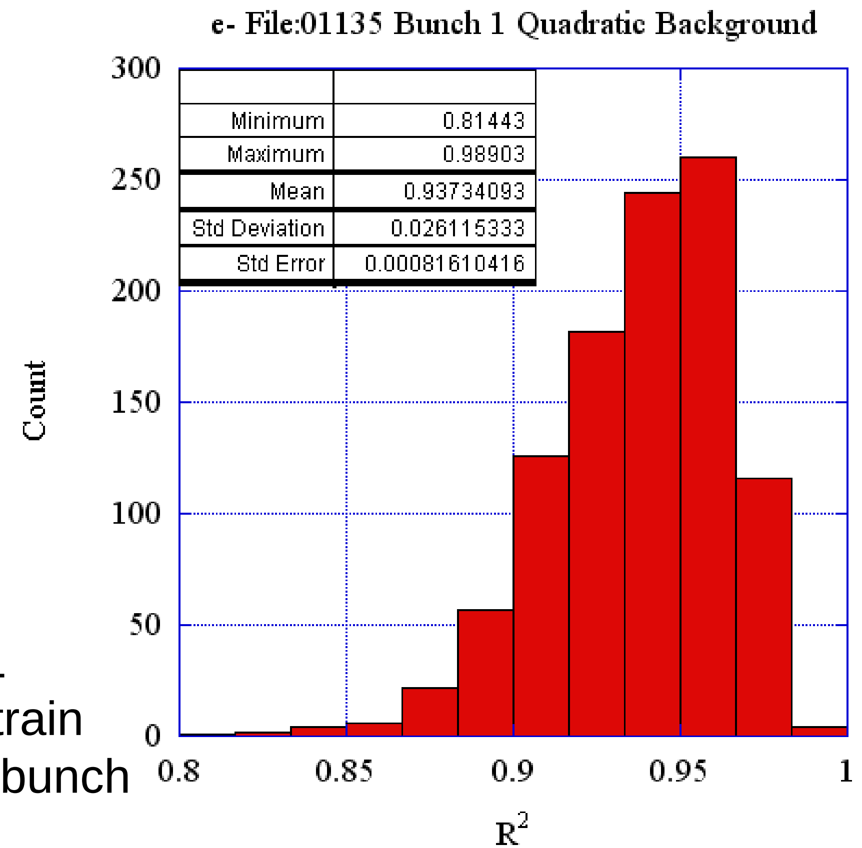
e-
20 bunch train
I=0.75mA/bunch

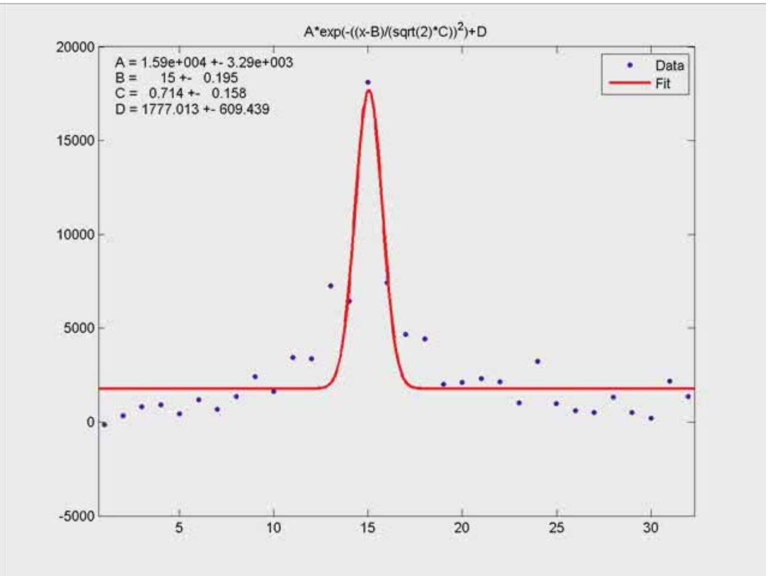
e- comparison between flat and quadratic background



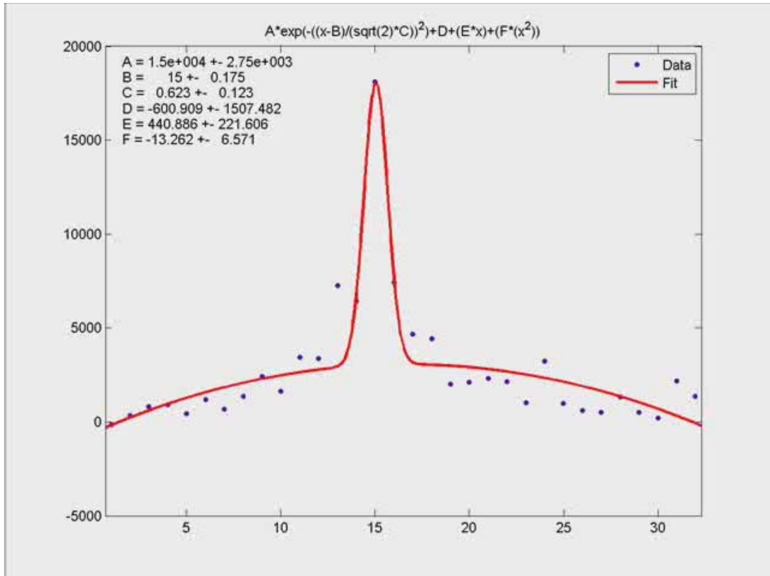


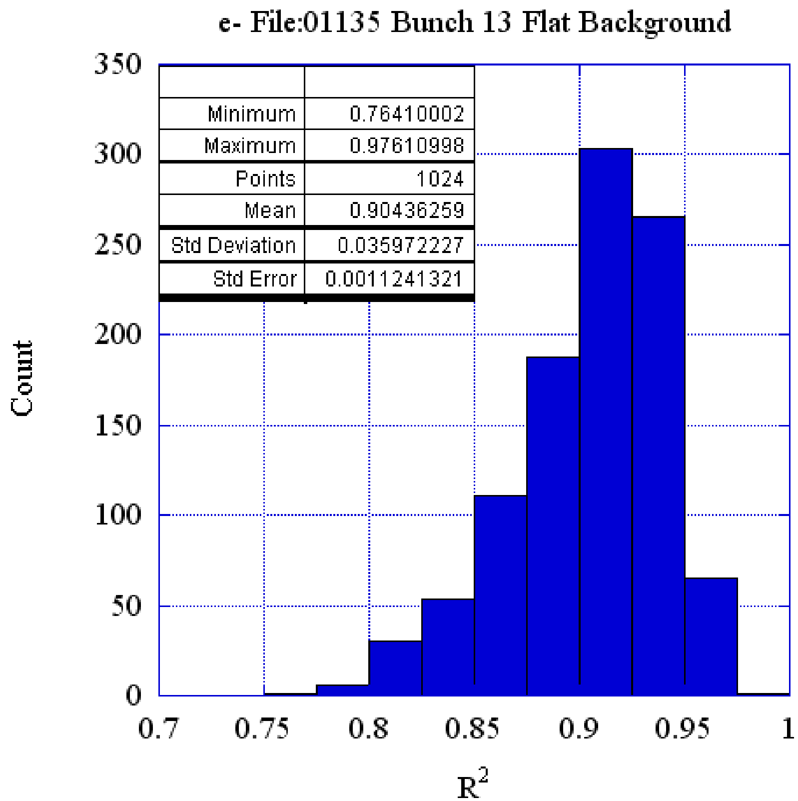
e- bunch 1
20 bunch train
I=0.75mA/bunch

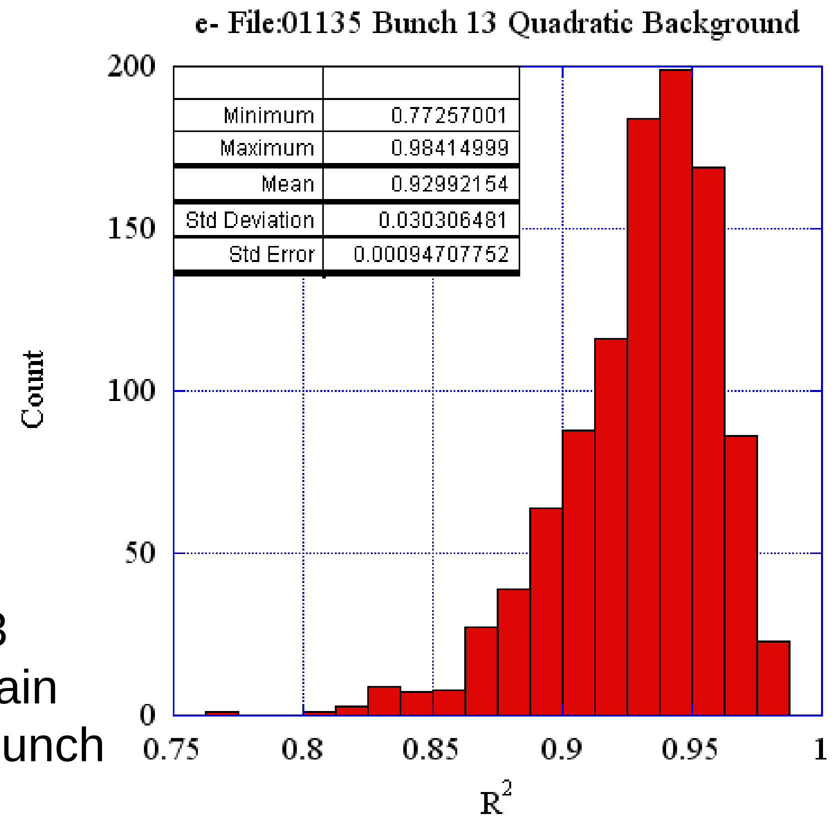




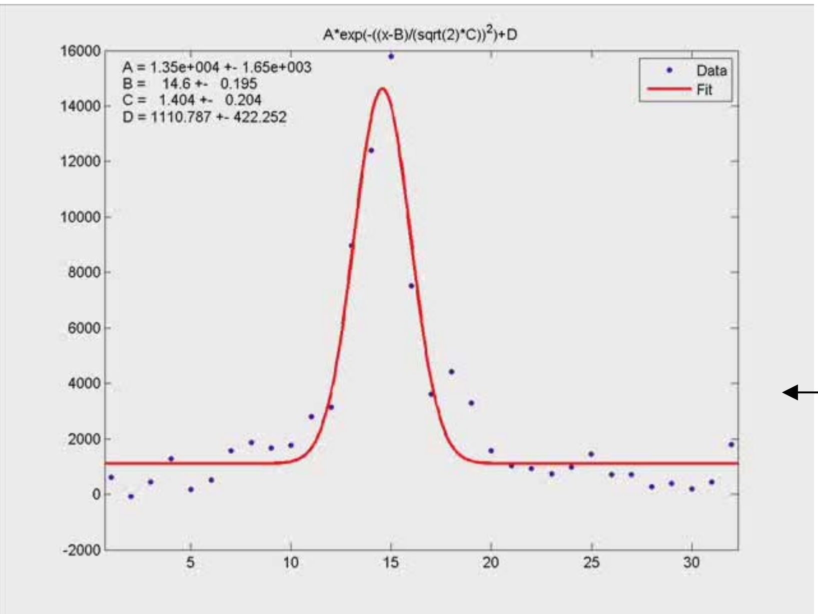
25 turn Movie



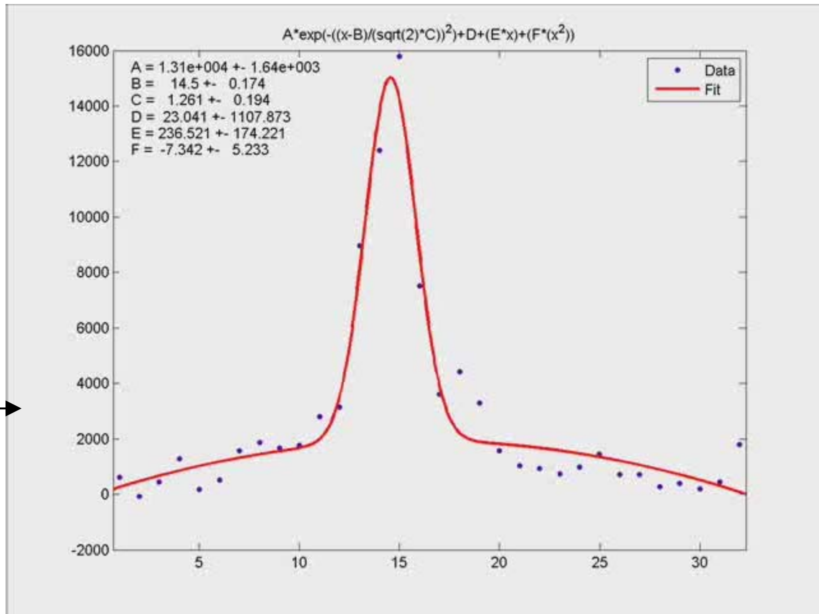


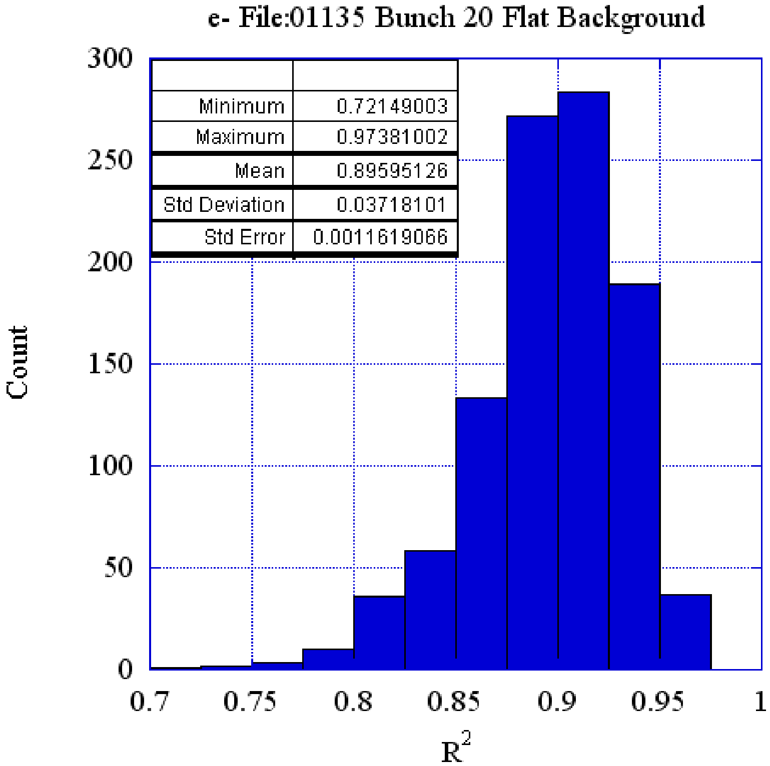


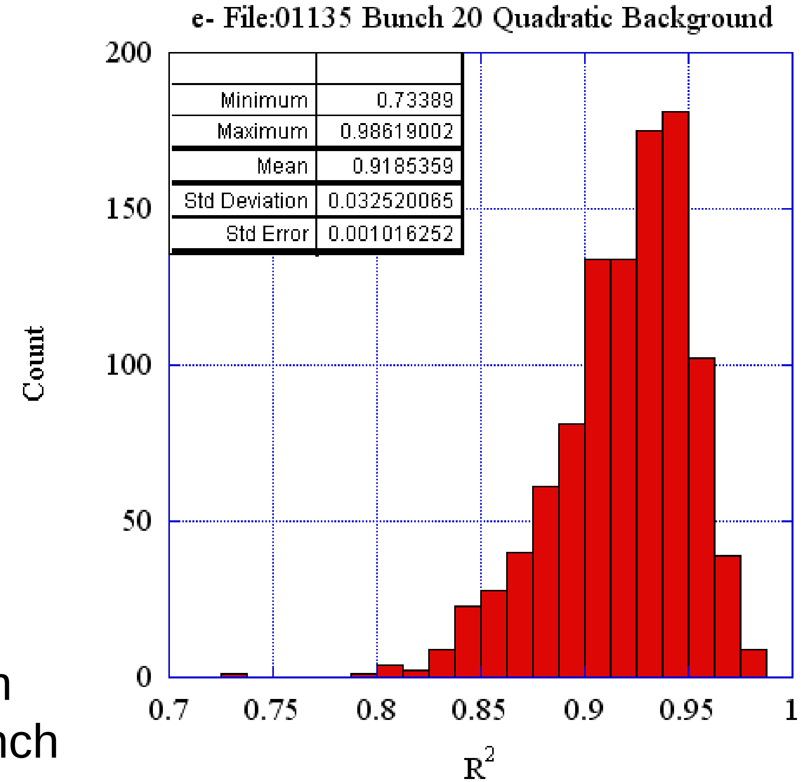
e- bunch 13
20 bunch train
I=0.75mA/bunch



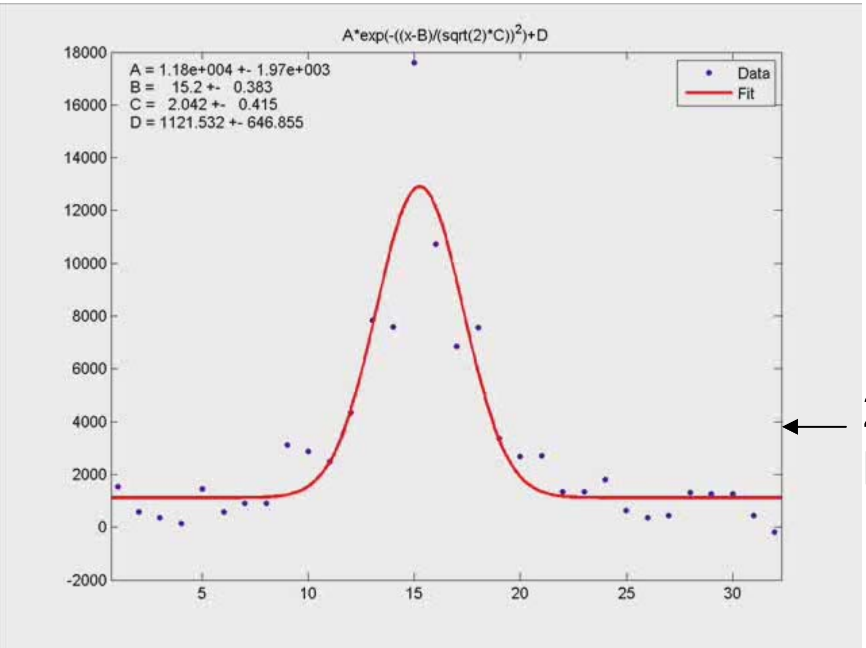
25 turn
Movie



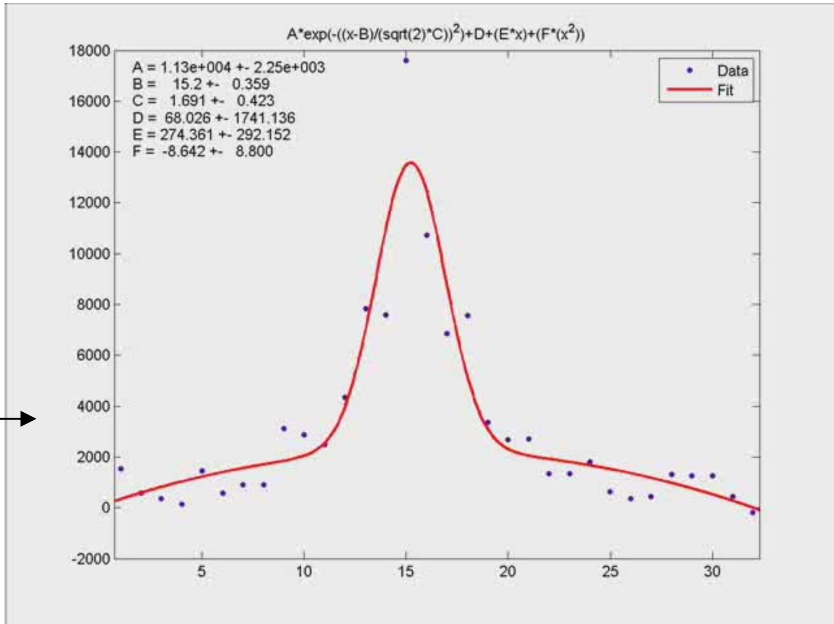


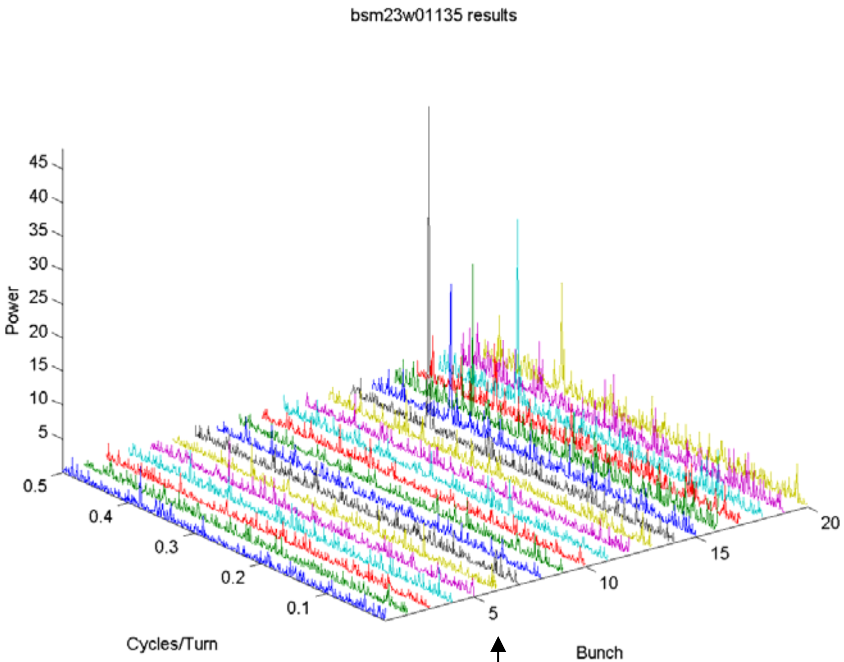


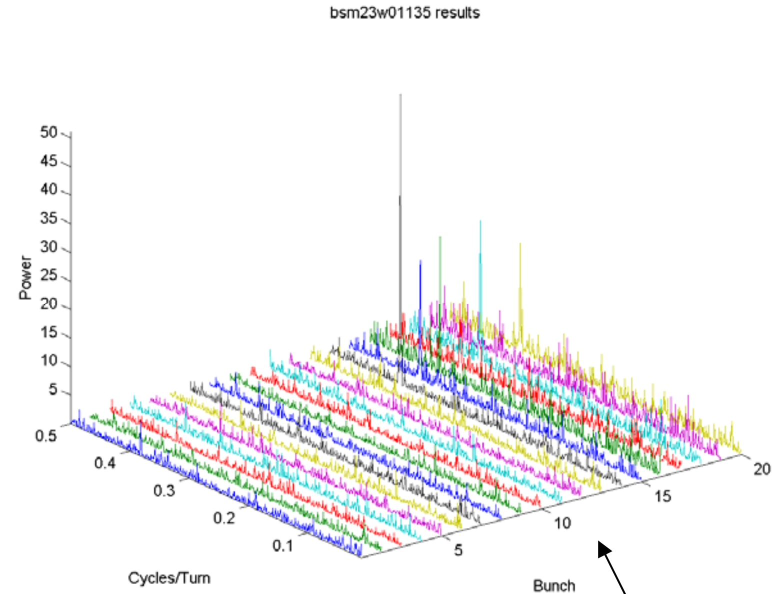
e- bunch 20
20 bunch train
I=0.75mA/bunch



25 turn Movie

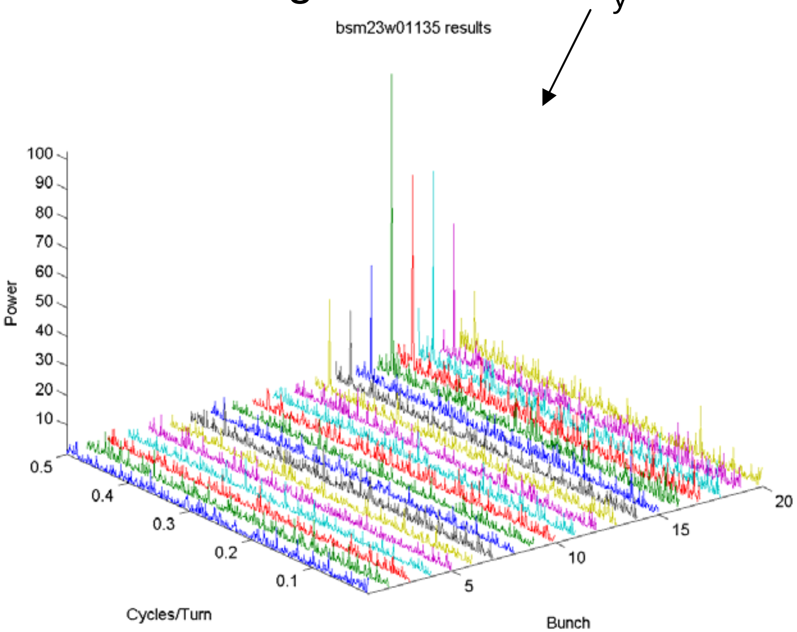


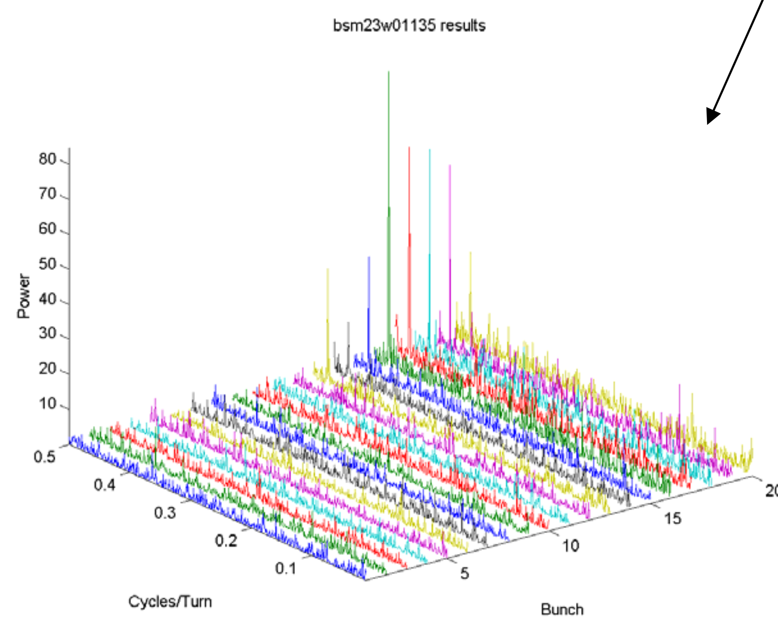


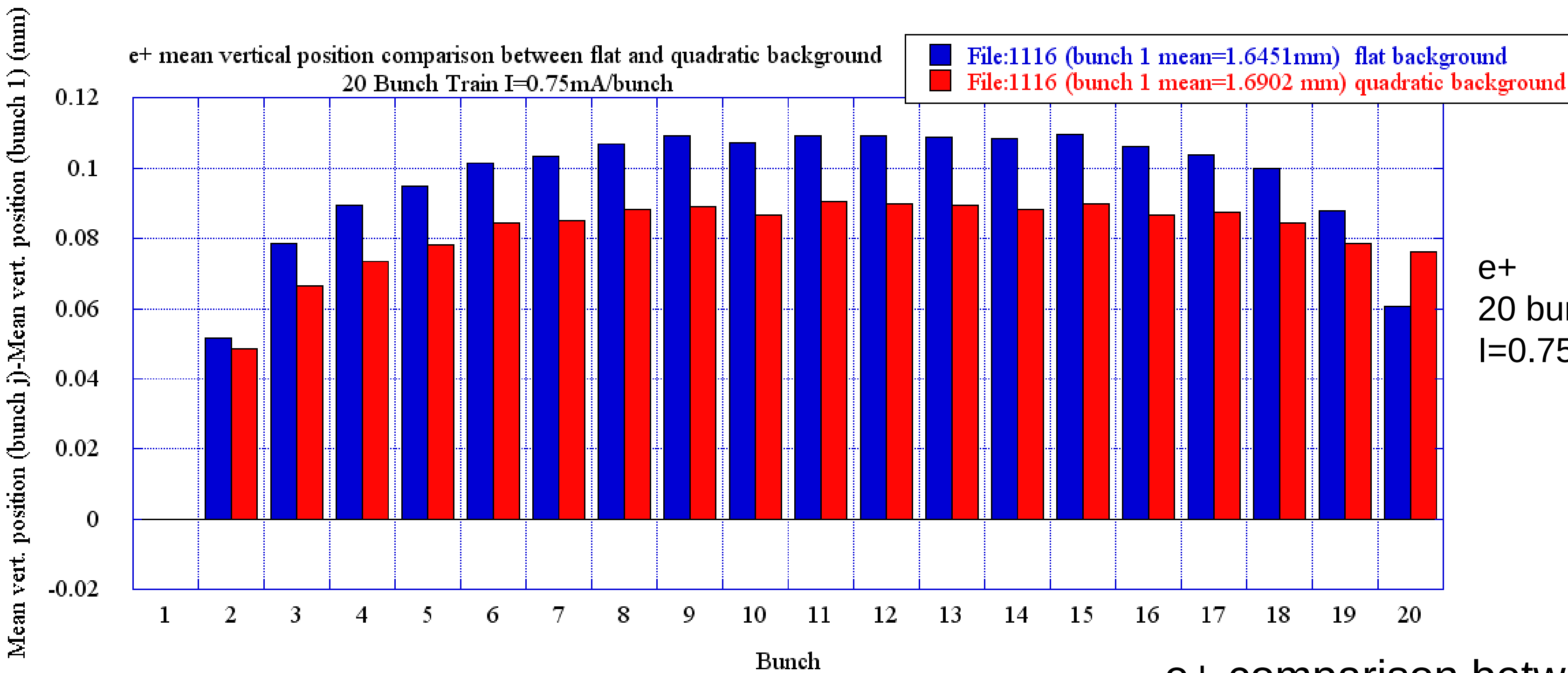


FFT Flat Background mean/σ_y

FFT Quadratic Background mean/σ_y

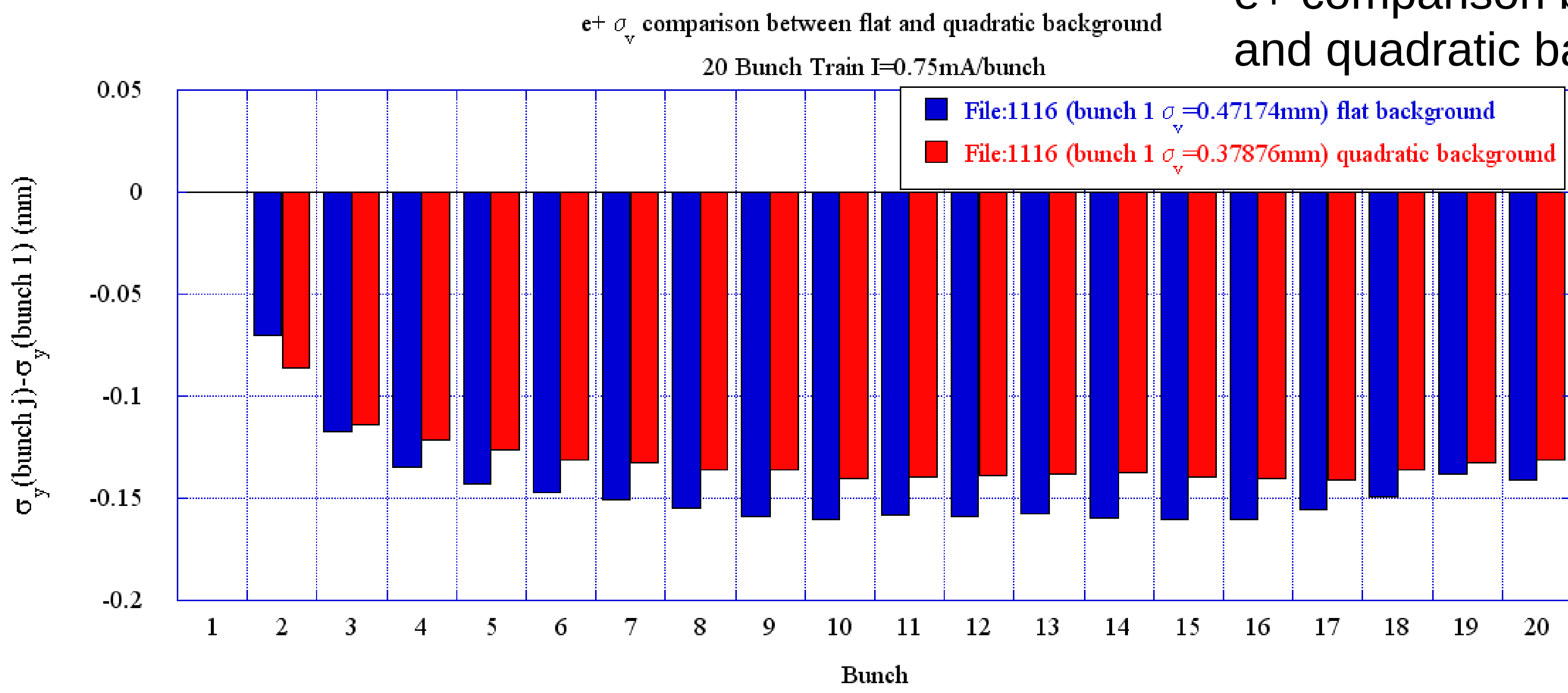


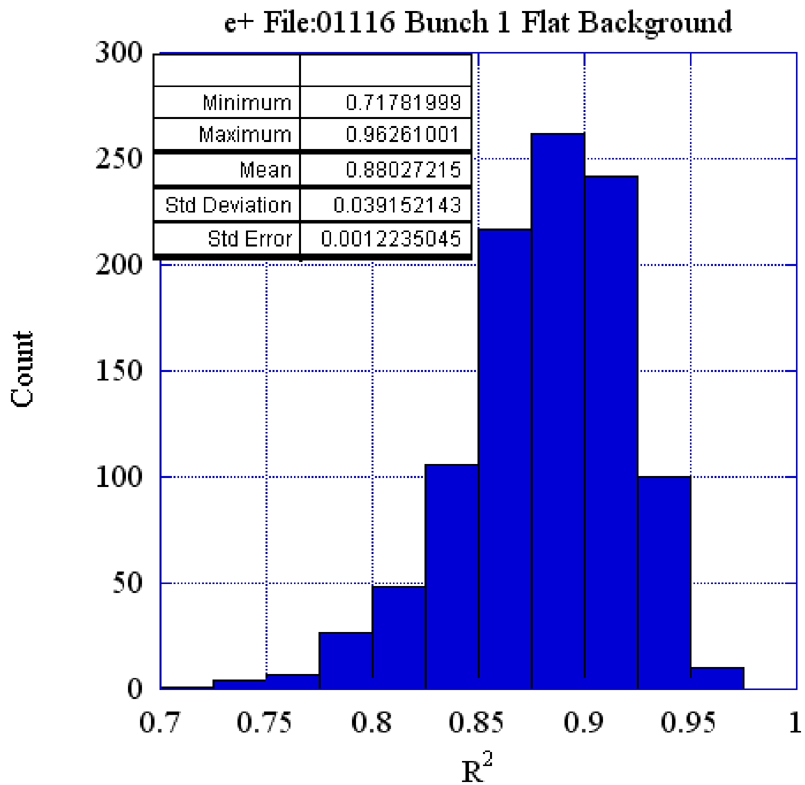


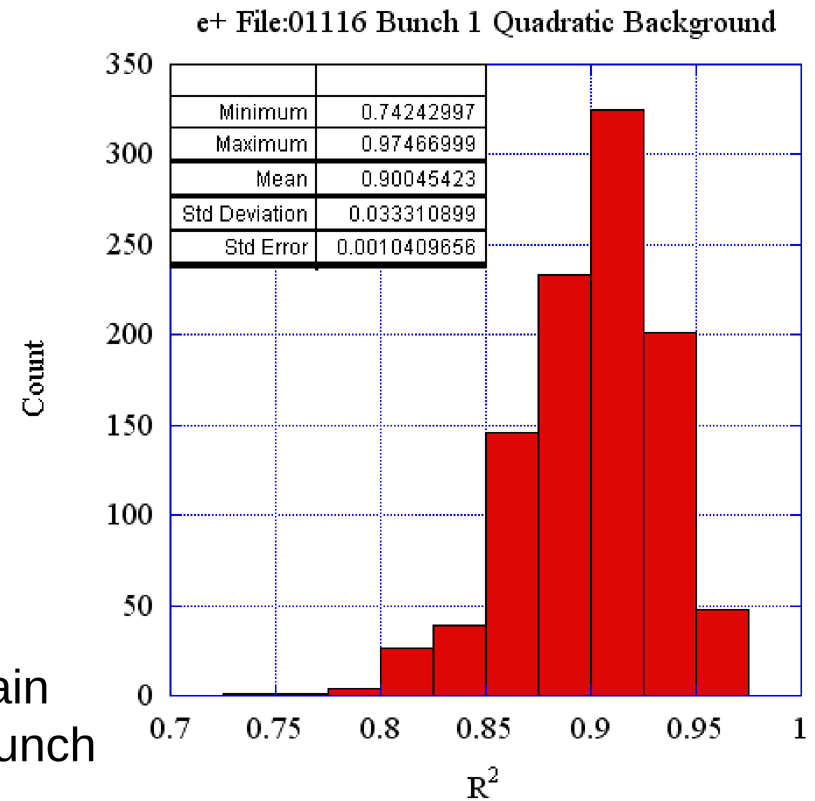


e+
20 bunch train
I=0.75mA/bunch

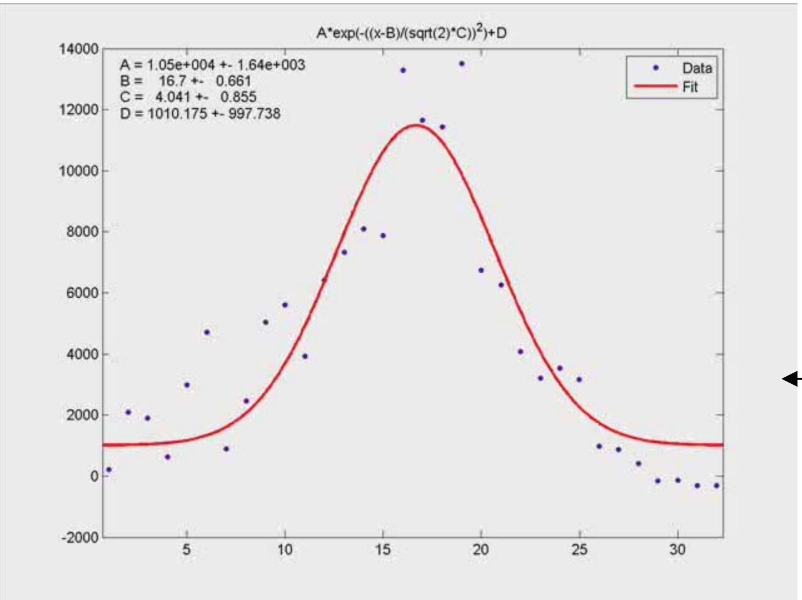
e+ comparison between flat and quadratic background



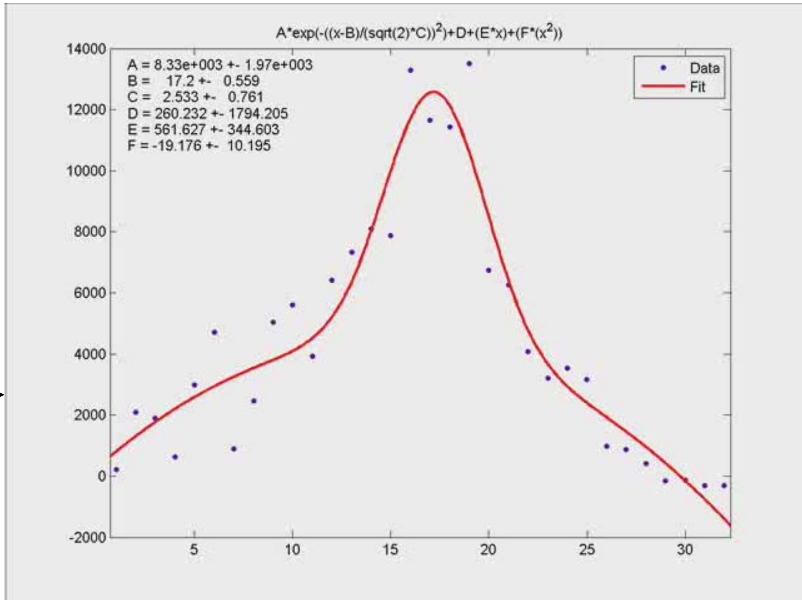


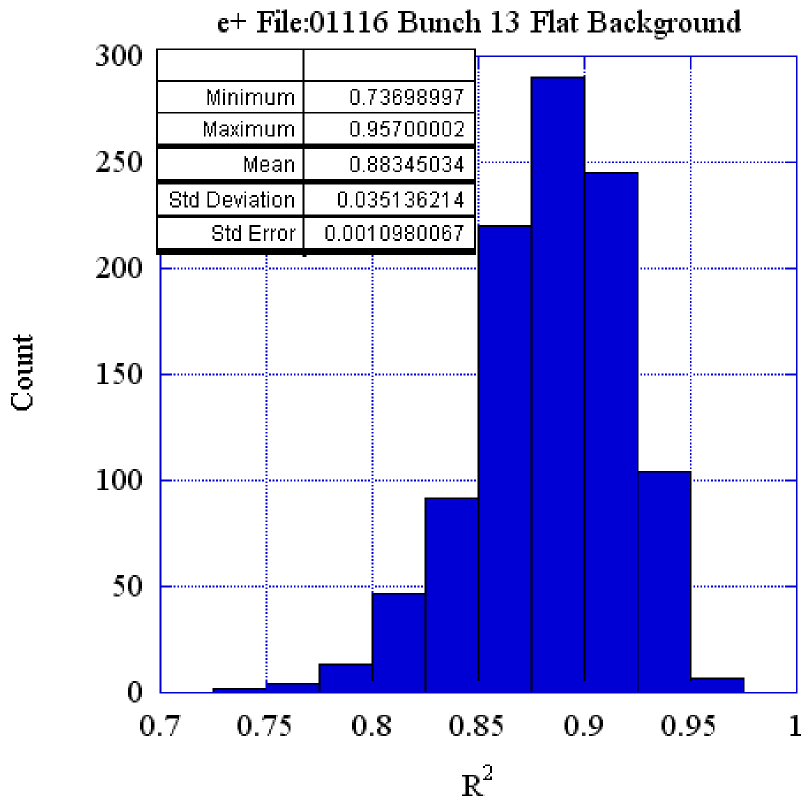


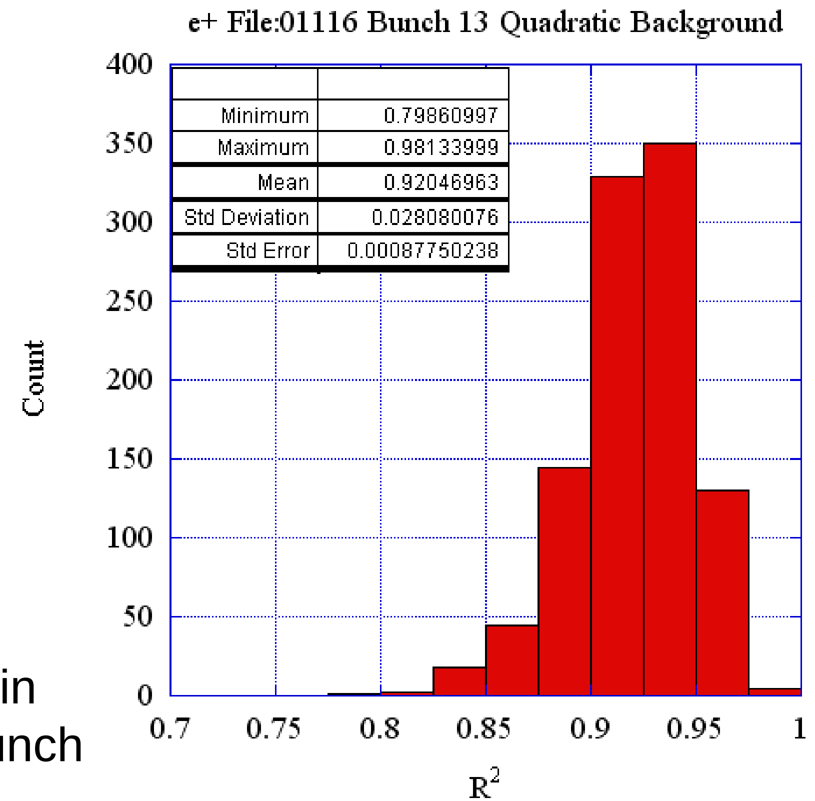
e+ bunch 1
20 bunch train
I=0.75mA/bunch



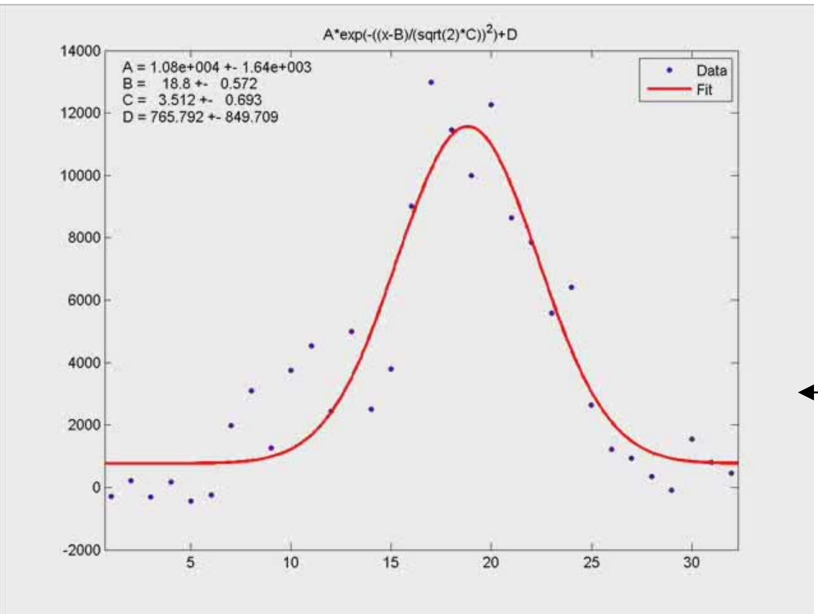
25 turn Movie



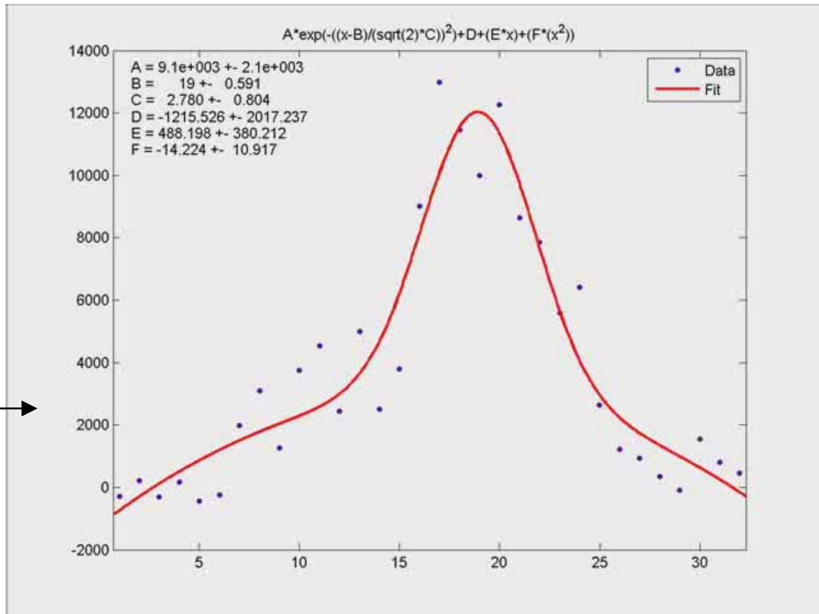


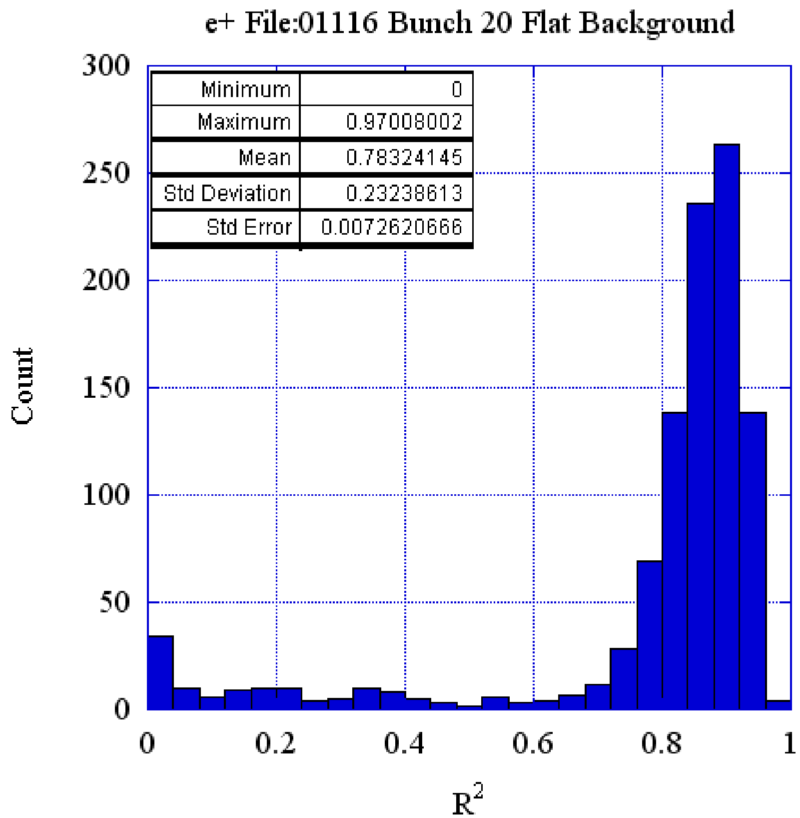


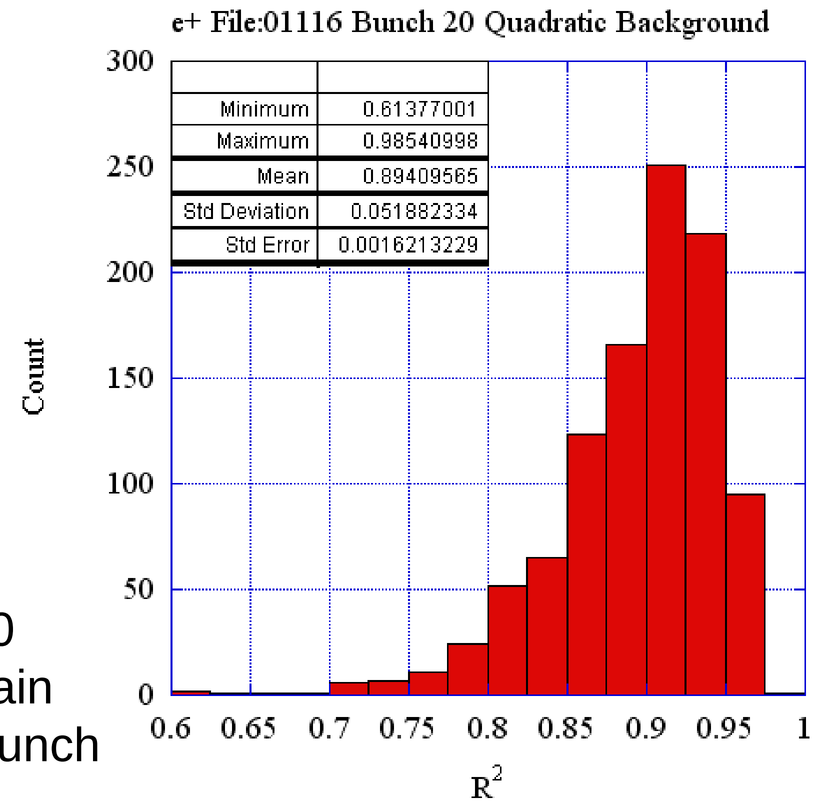
e+ bunch 13
20 bunch train
I=0.75mA/bunch



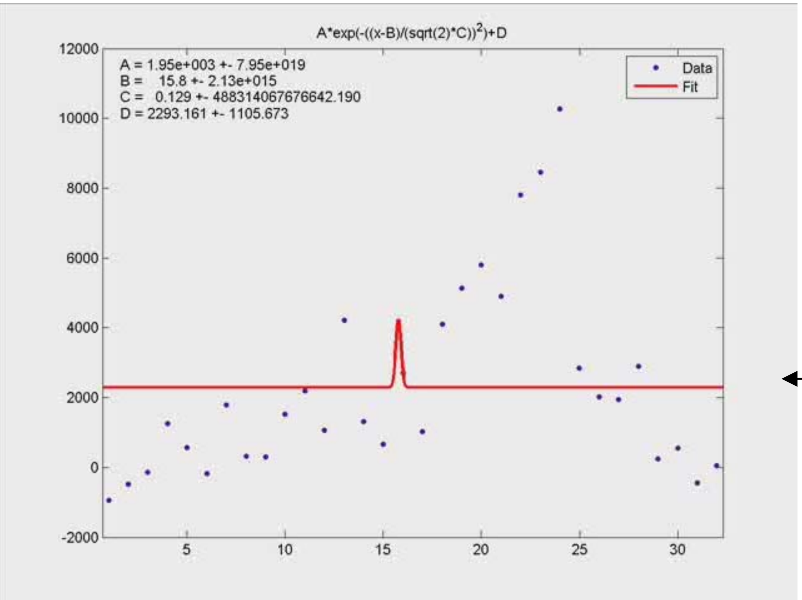
25 turn
Movie



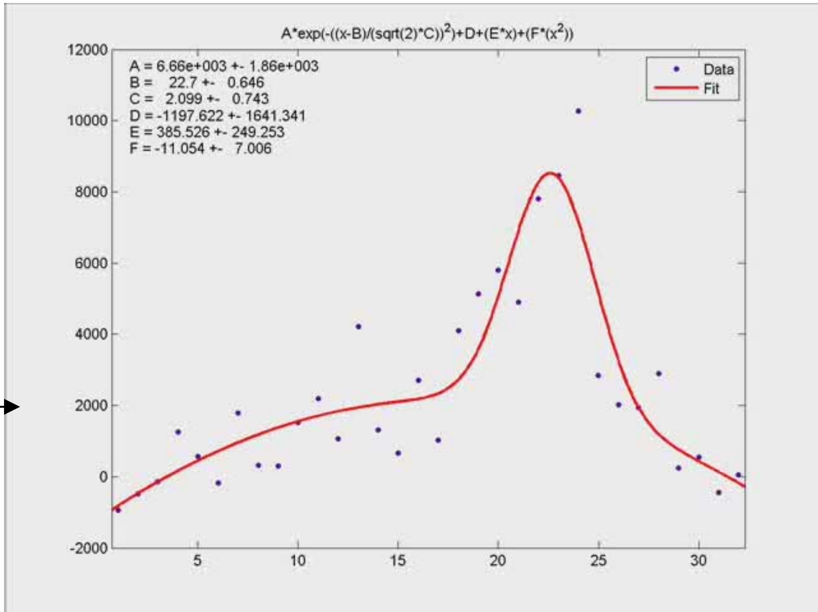


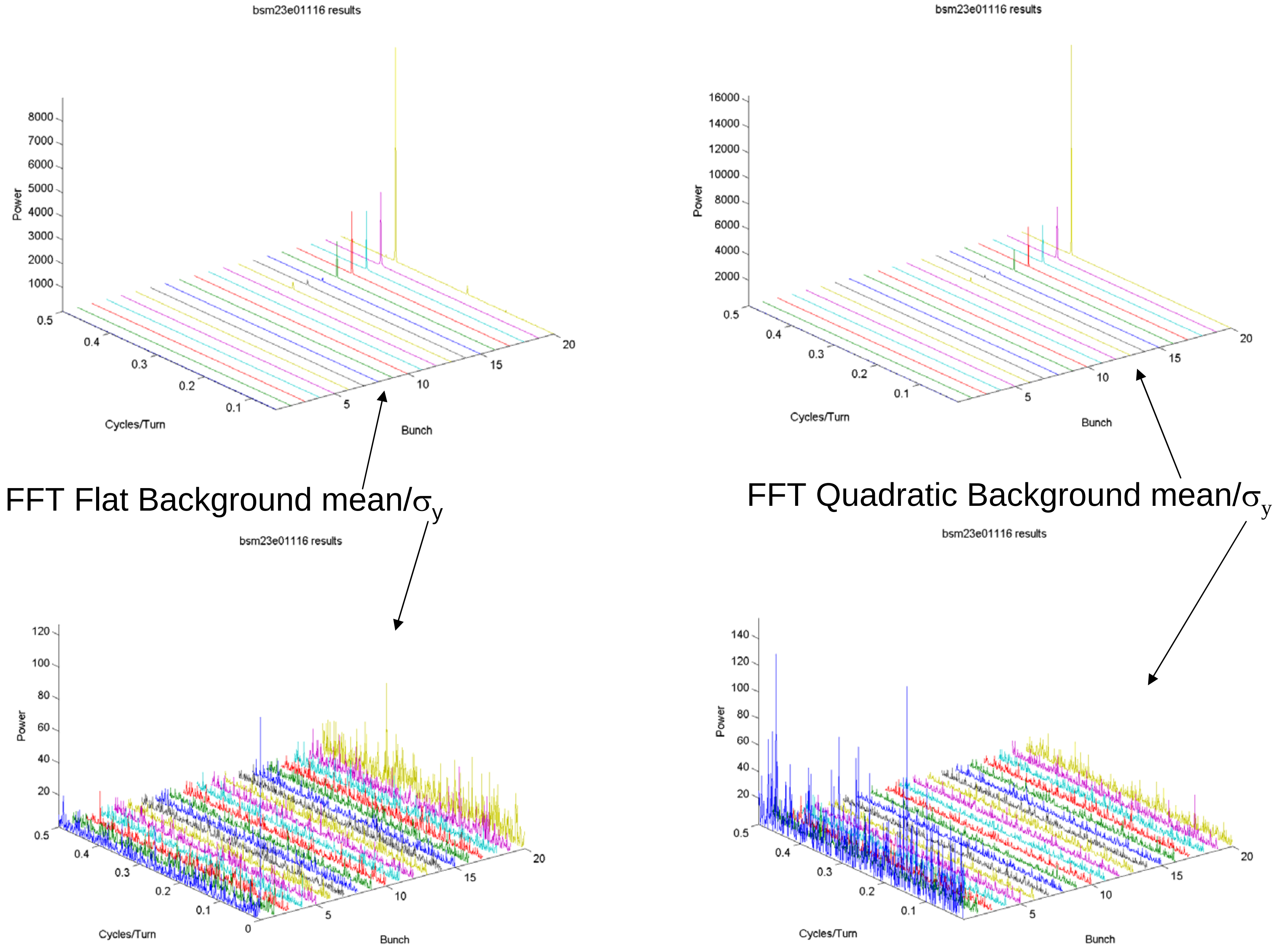


e+ bunch 20
20 bunch train
I=0.75mA/bunch



← 25 turn Movie →




bsm23e01116 results
Power
Cycles/Turn
Bunch
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FFT Flat Background mean/σ_y
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