Perfect Pulse Analysis for Pedestal Extraction

Algorithm for constructing perfect pulse to extract pedestal :

- **Construct average pulse** : Using Amplified 600 sequence (from DST) , take sum over all 600 pulses in that sequence. However divide the sum by 599 to get the average single pulse signal.
- **Construct the image (surrogate) pulse**: From each of the original 600 pulses subtract the average pulse signal. (Actually I did the opposite here i.e. $I_{ave} - I_i$ to get positive values)
- **Construct perfect pulse :** Wrap the image pulse (all 600 windows) to get the perfect pulse with pedestal already removed.
- **Fit perfect pulse to real data :**

  Fit each pulse from real data to the constructed perfect pulse according to :

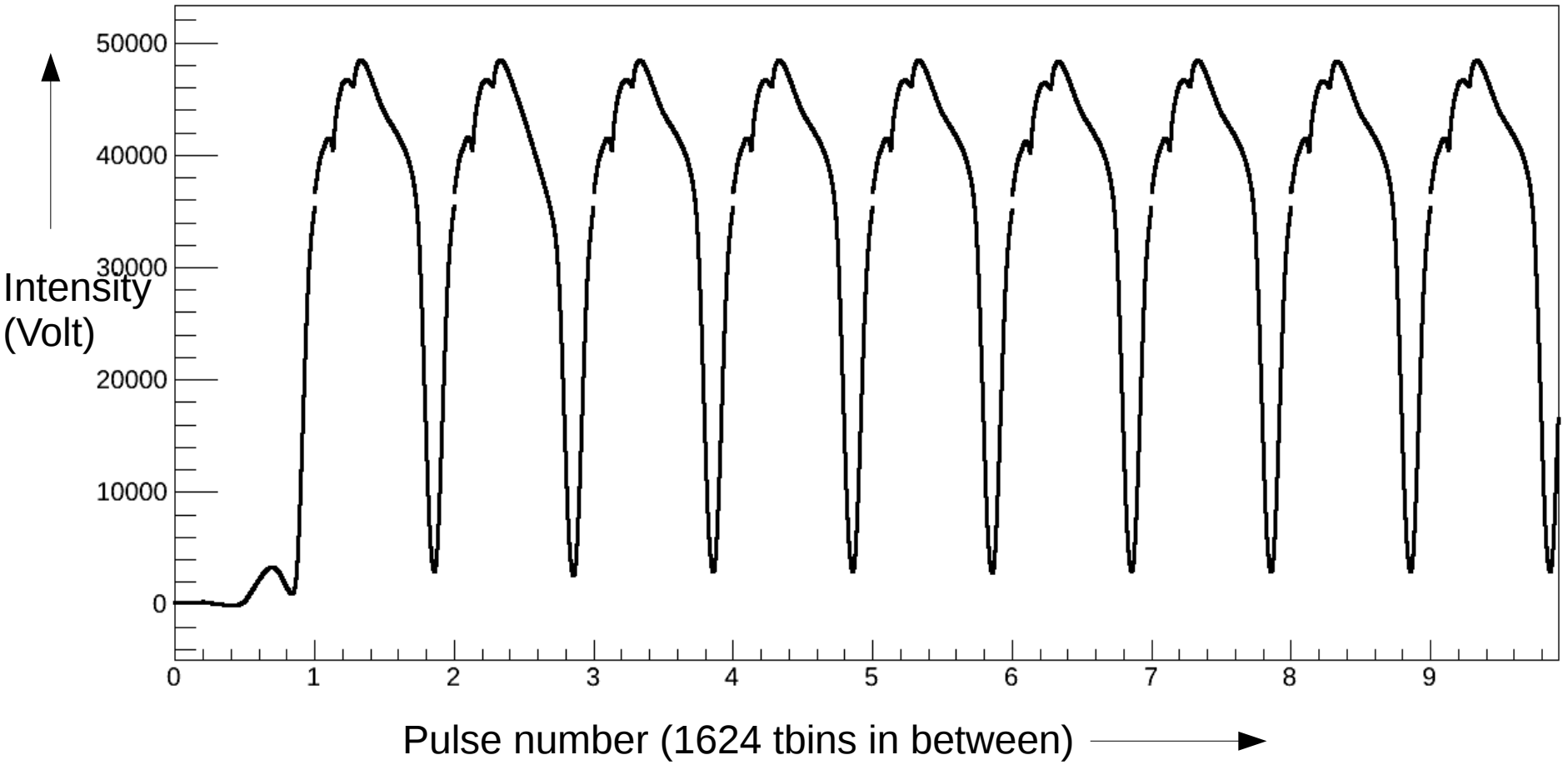
  $$Y(tof) = a\,P(tof) + b$$

  Where Y(tof) is the signal from real data and P(tof) is the signal from perfect pulse.

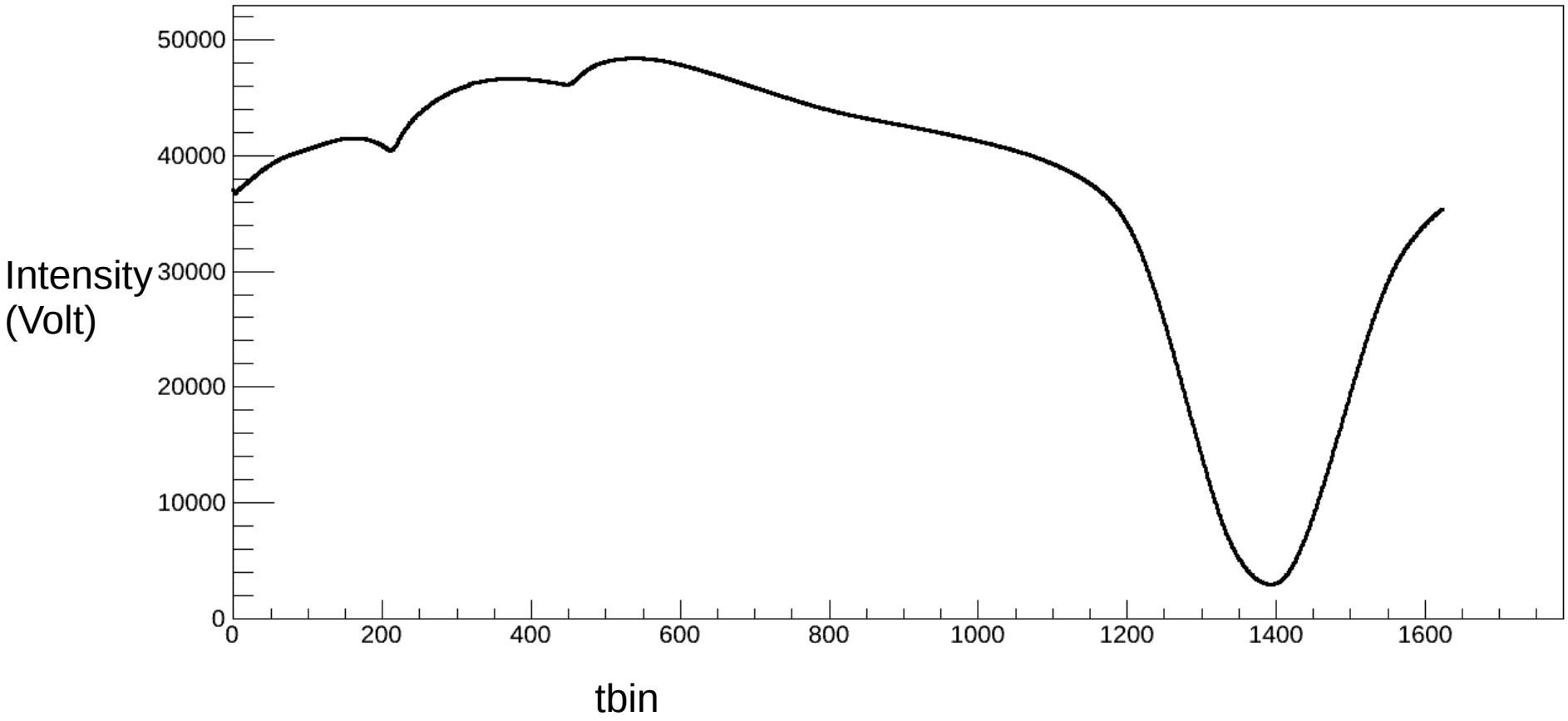
  From the fit a and b will give variation in beam intensity and pedestal respectively.

- I will be showing this analysis for M1 Signal and focus mainly on he details of the image pulse as an attempt to explain beam profile.

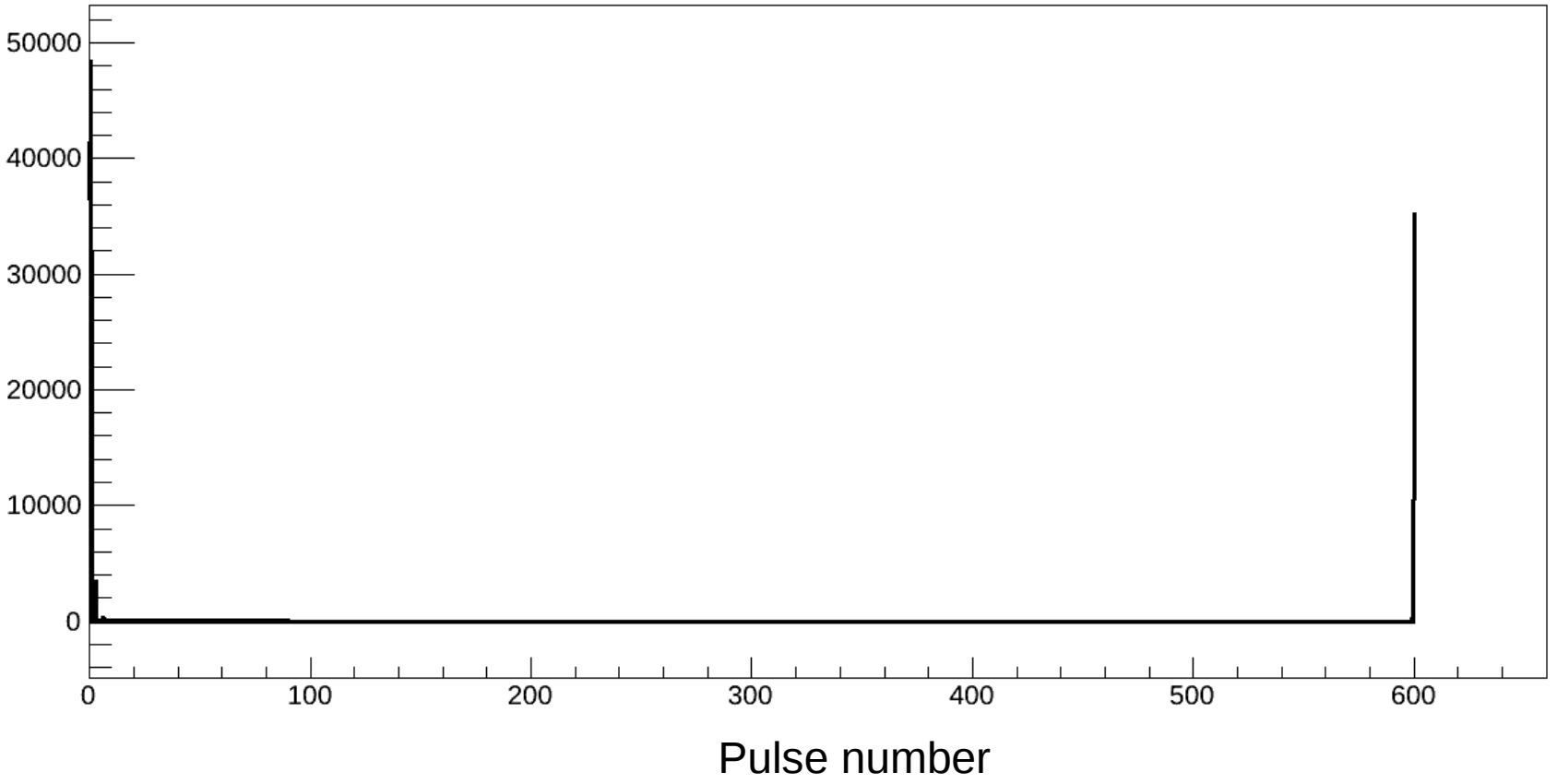
M1 Signal form amplified (17125 times) 600 sequence



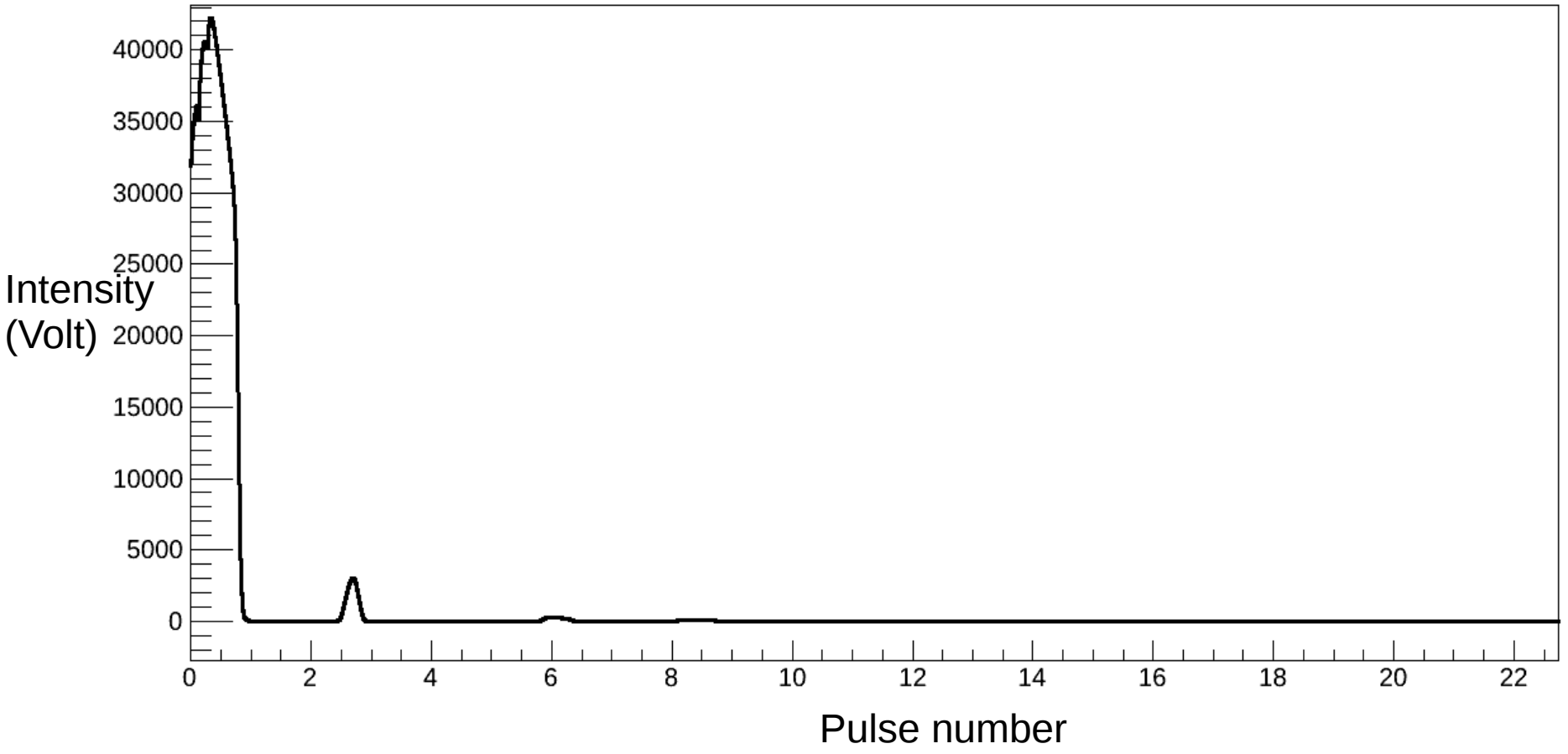
Average M1 pulse signal constructed from 600 pulses



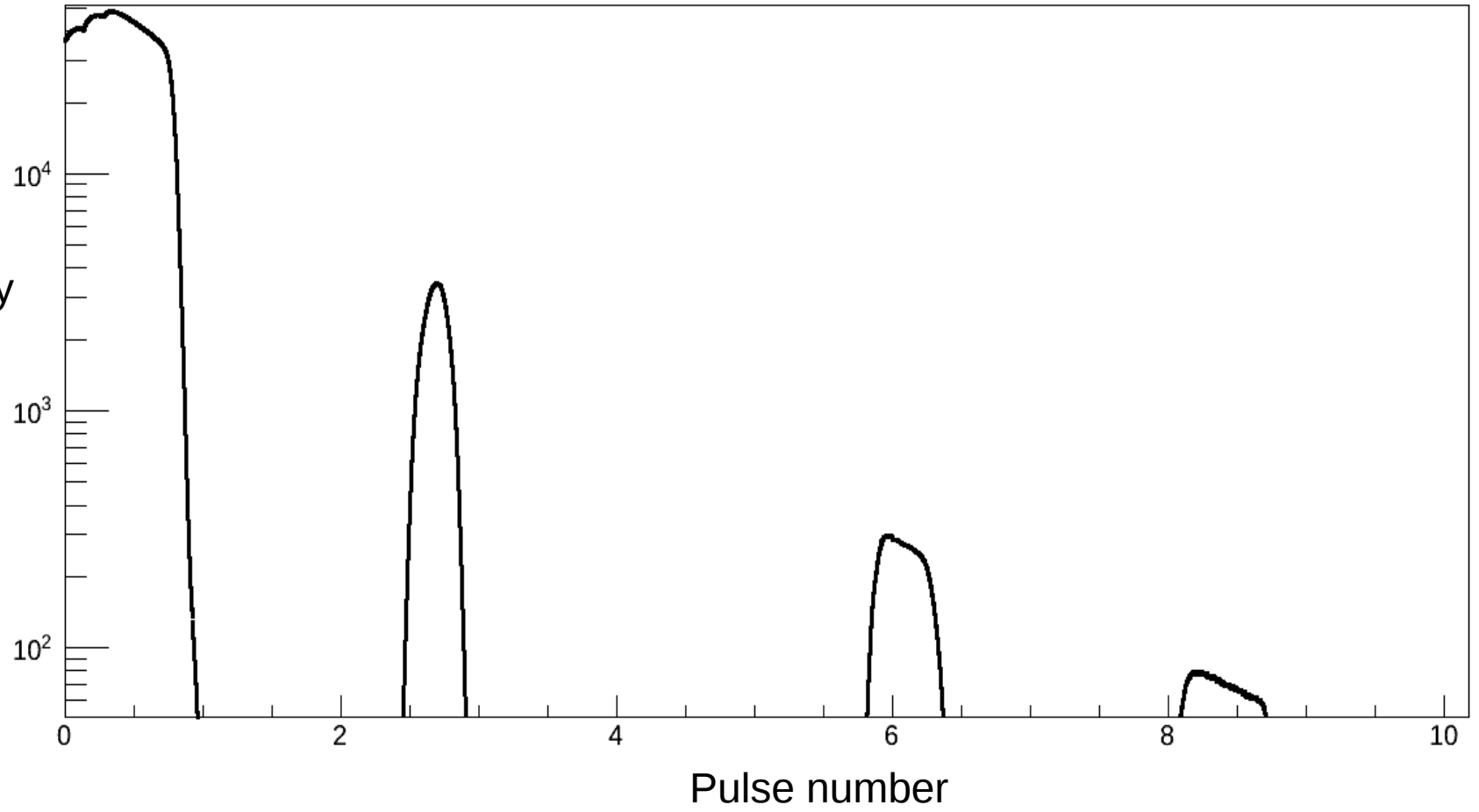
Image(surrogate) pulse constructed from (I_{ave} - I_i) – full view



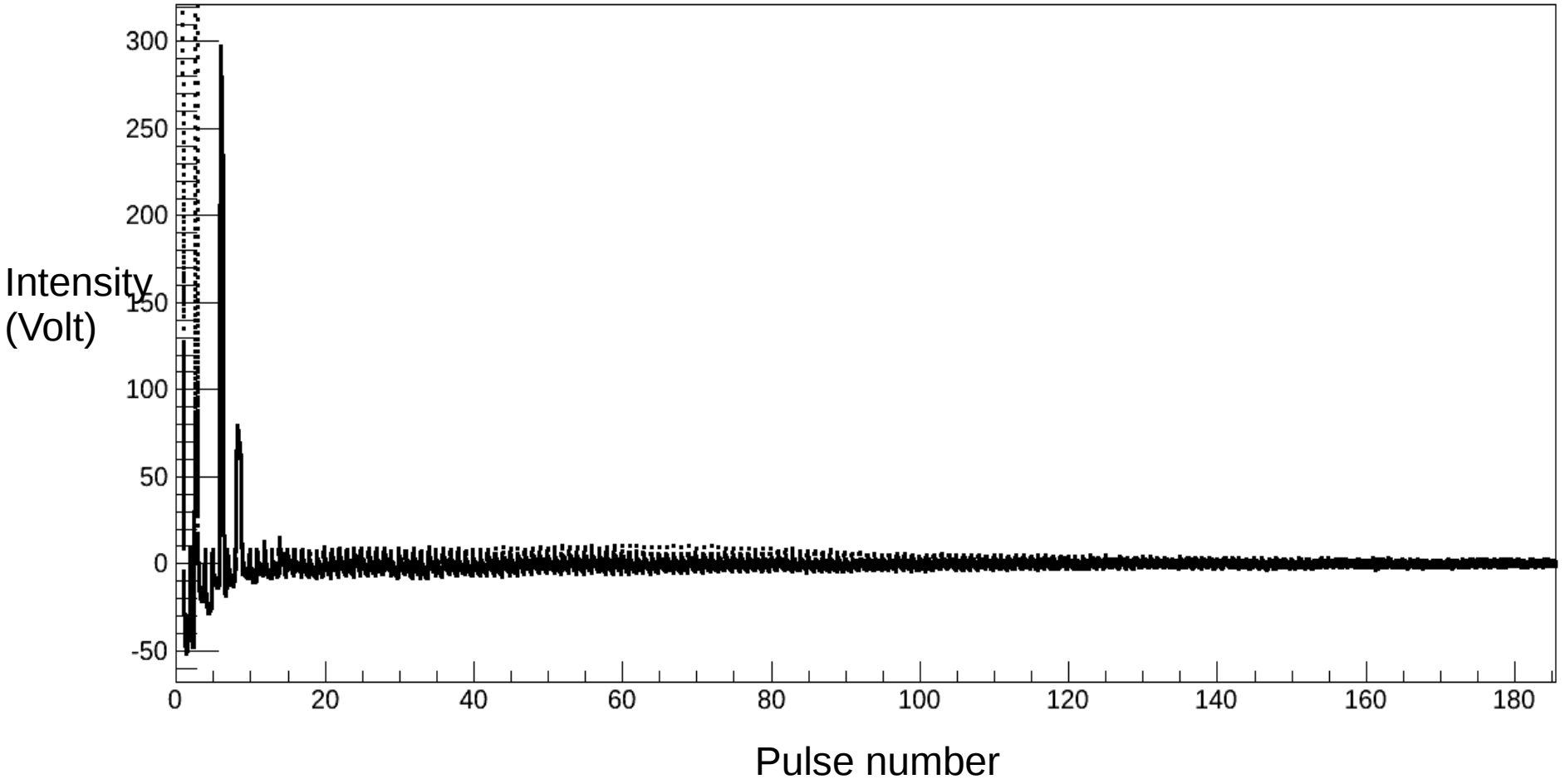
Image(surrogate) pulse constructed from (I_{ave} - I_i) – Zoom 1



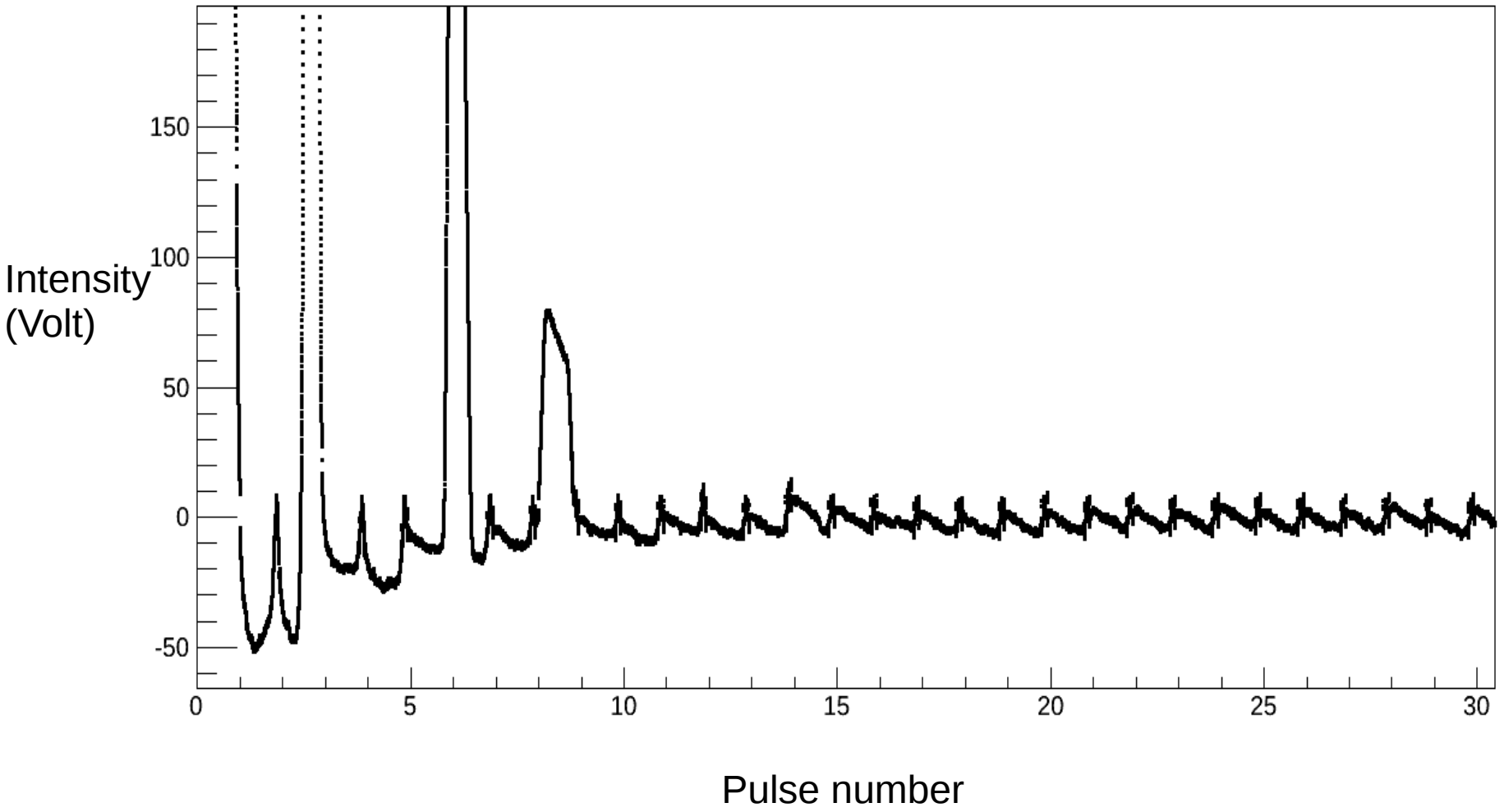
Image(surrogate) pulse constructed from (I_{ave} - I_i)
Zoom 2 (log scale)



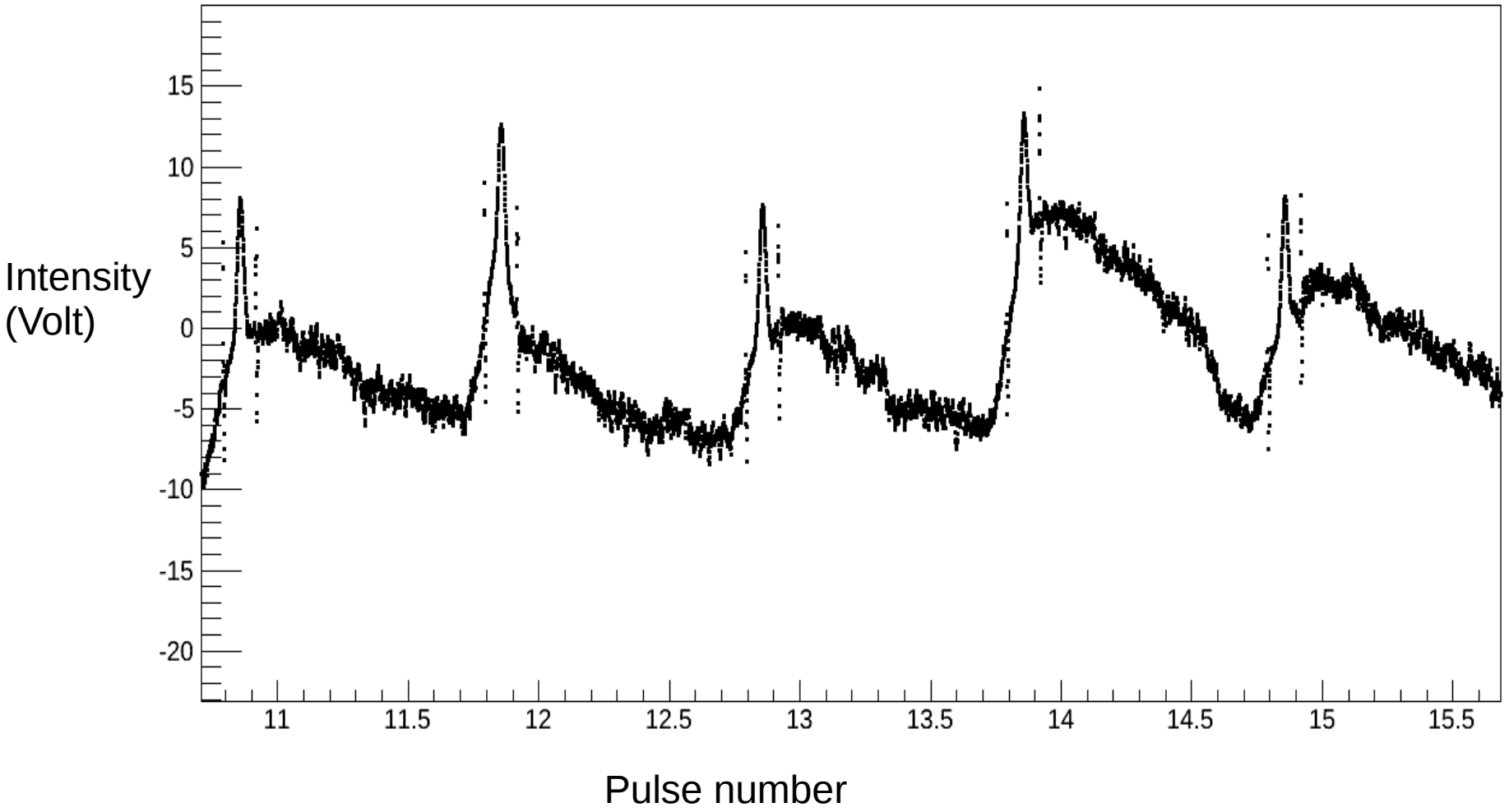
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 3



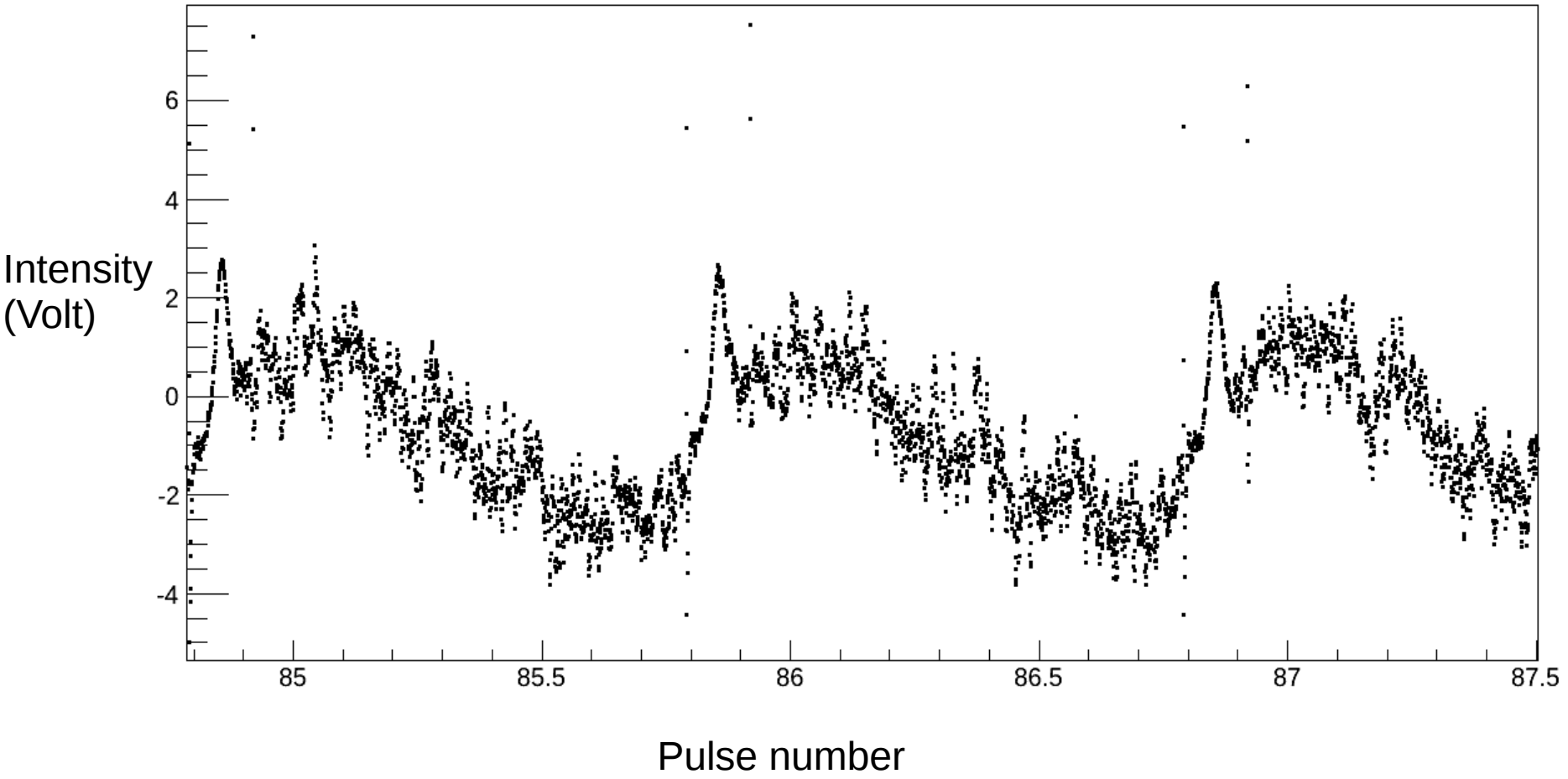
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 4



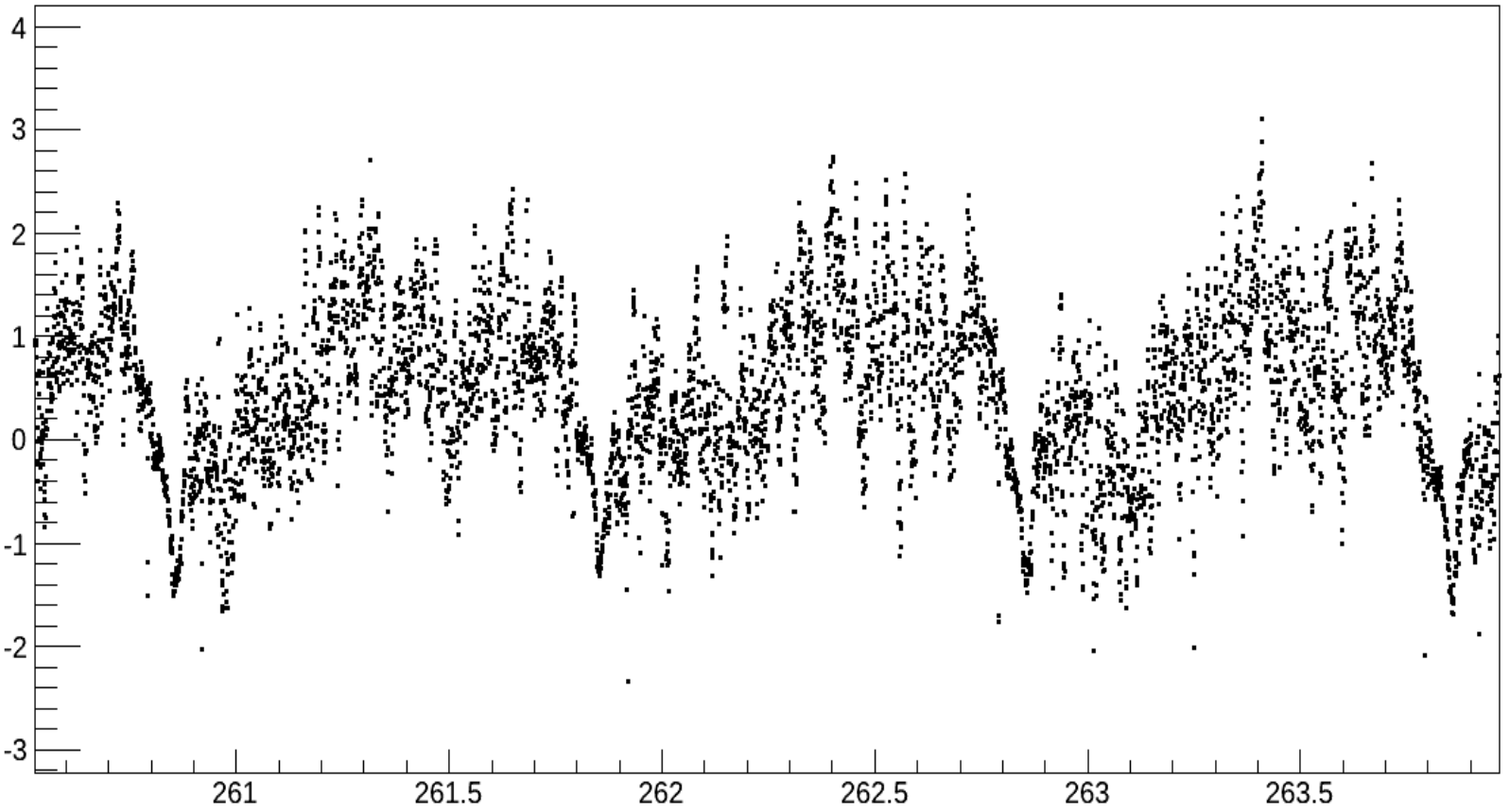
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 5



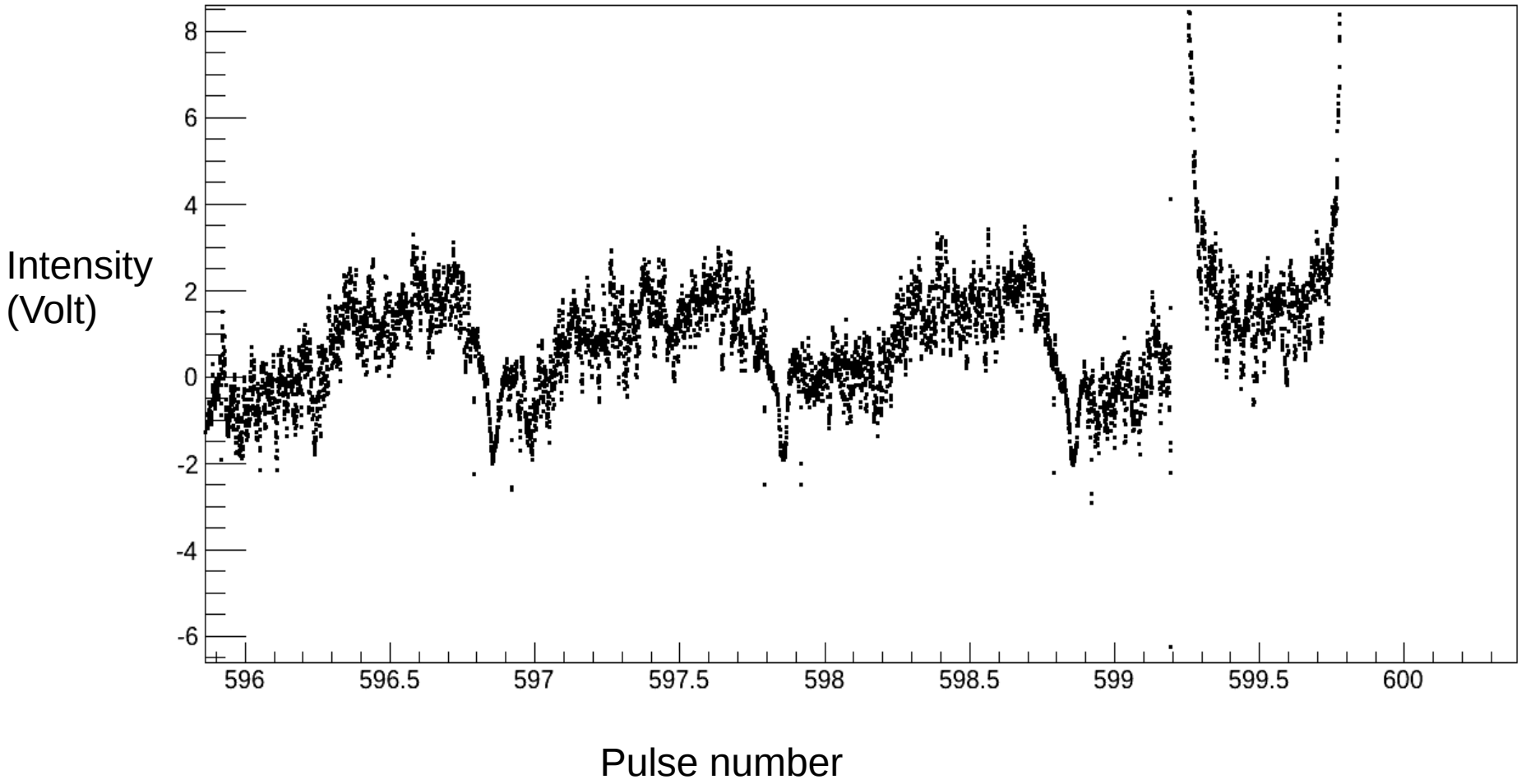
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 6



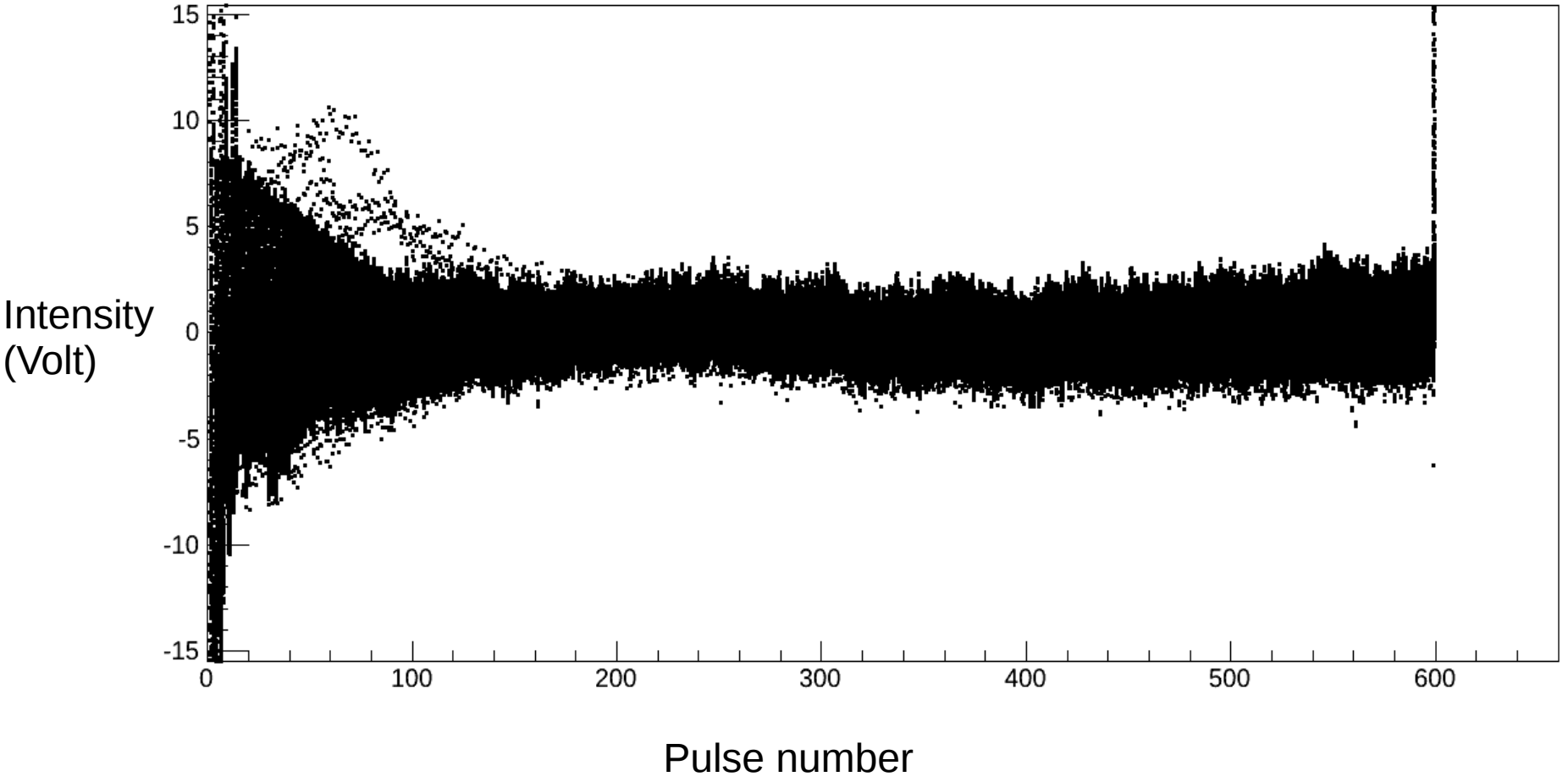
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 7



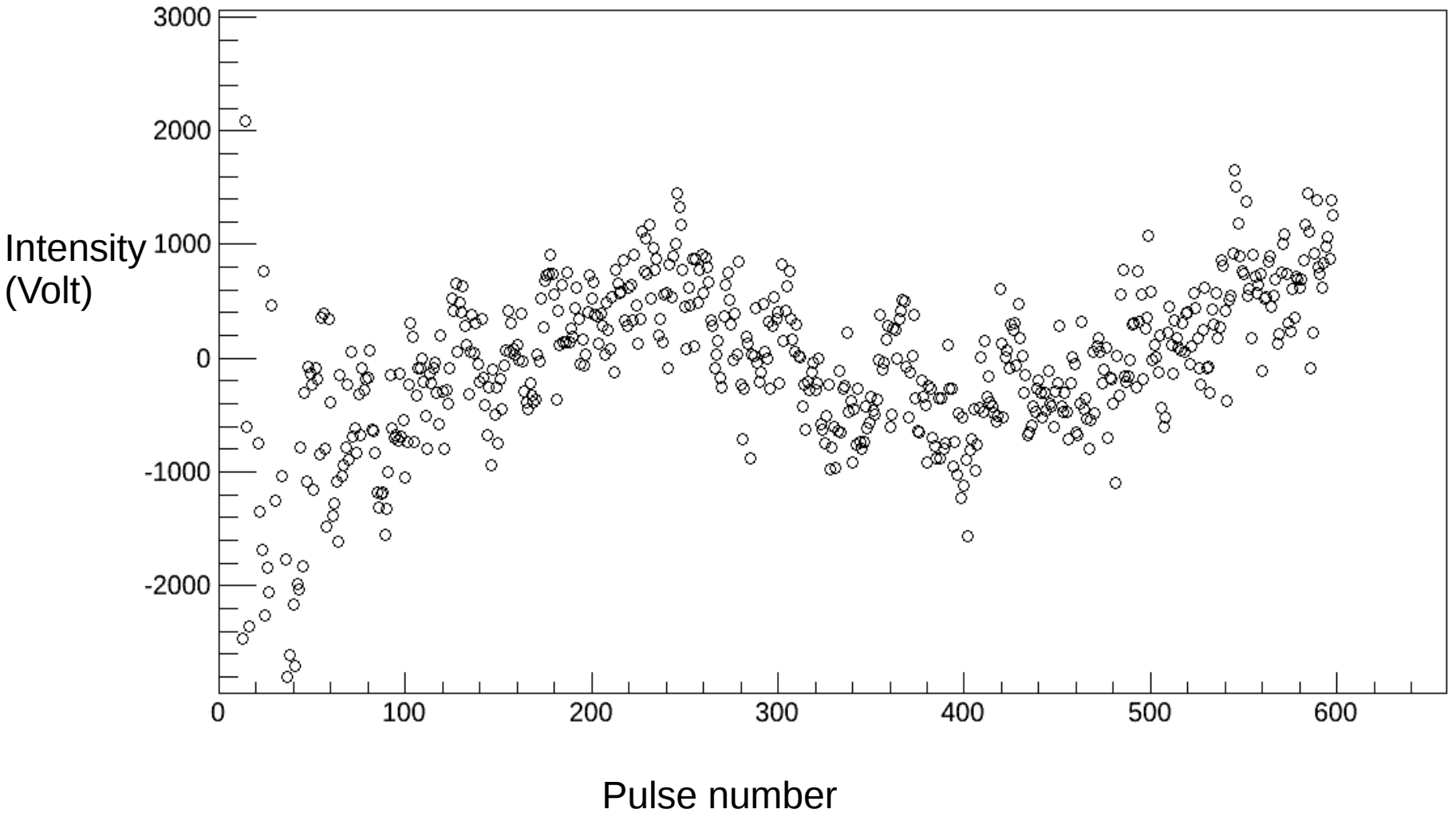
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 8



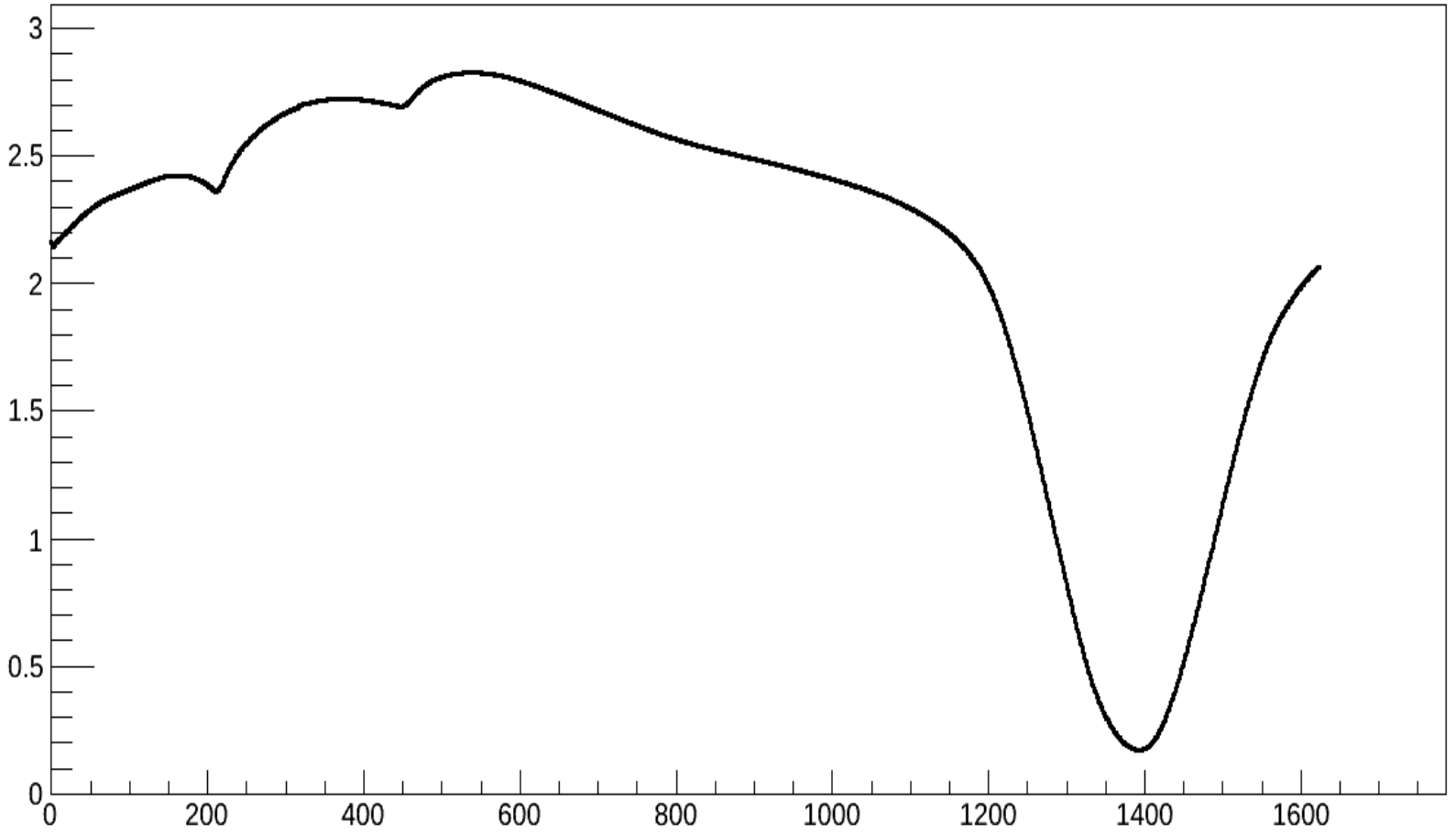
Image(surrogate) pulse constructed from (I_{ave} - I_i)–Zoom 9



Image(Surrogate) Pulse Intensity integrated over each pulse



Perfect pulse (NOT amplified) constructed by wrapping the image pulse



Next : Fitting real data to perfect pulse