

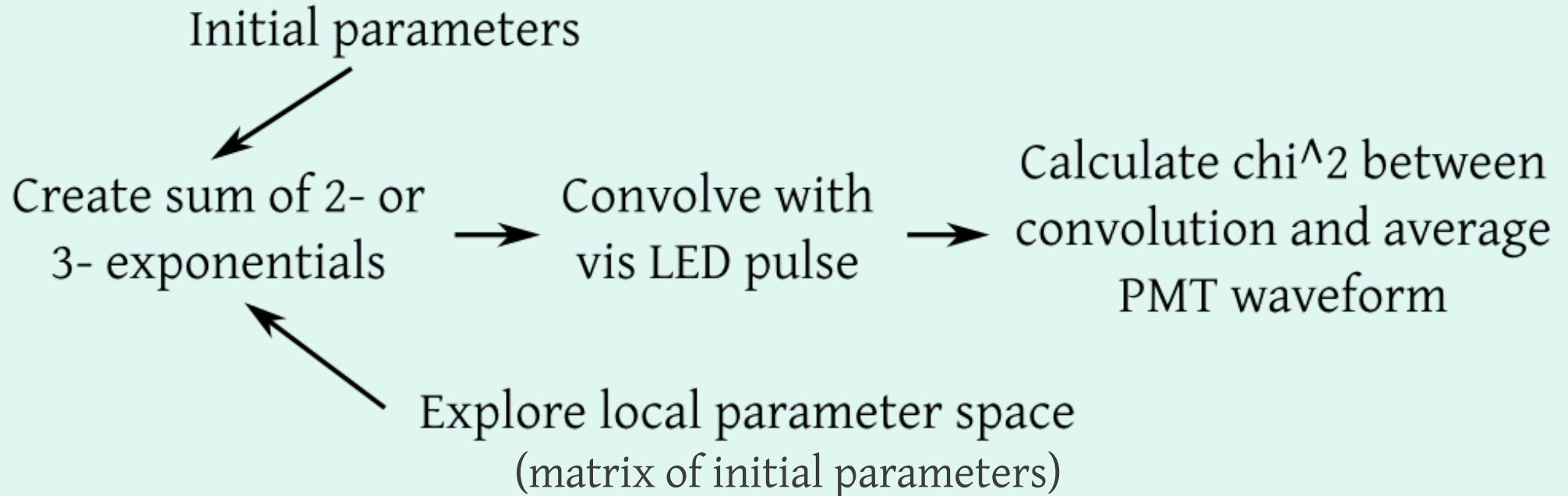
Template Fit Analysis: Fitting to PMT Waveforms using Convolutions

Talk 4 of 6

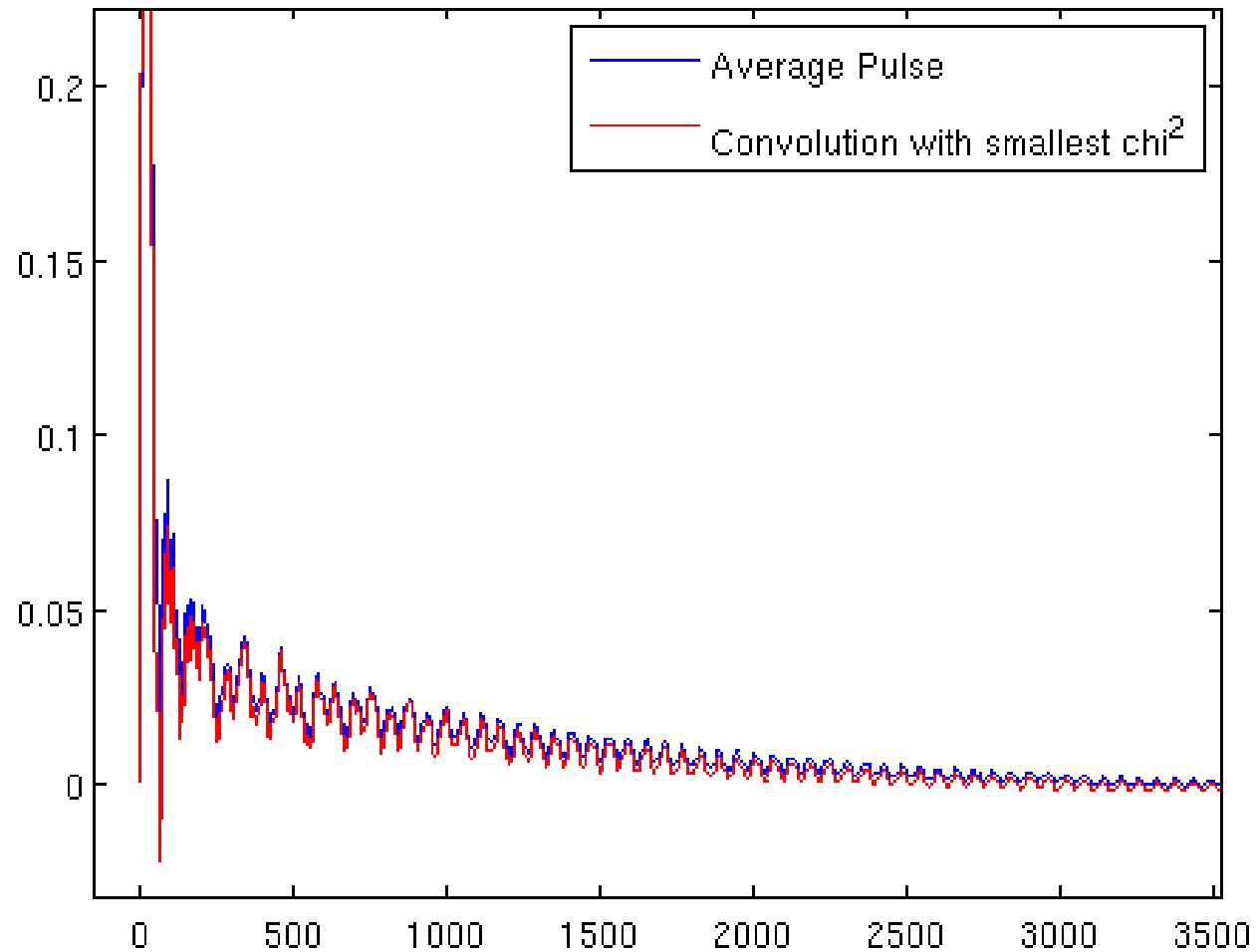
Christie Chiu
Bo VST: Feb 1 2013

Template Fit Method

MATLAB analysis:



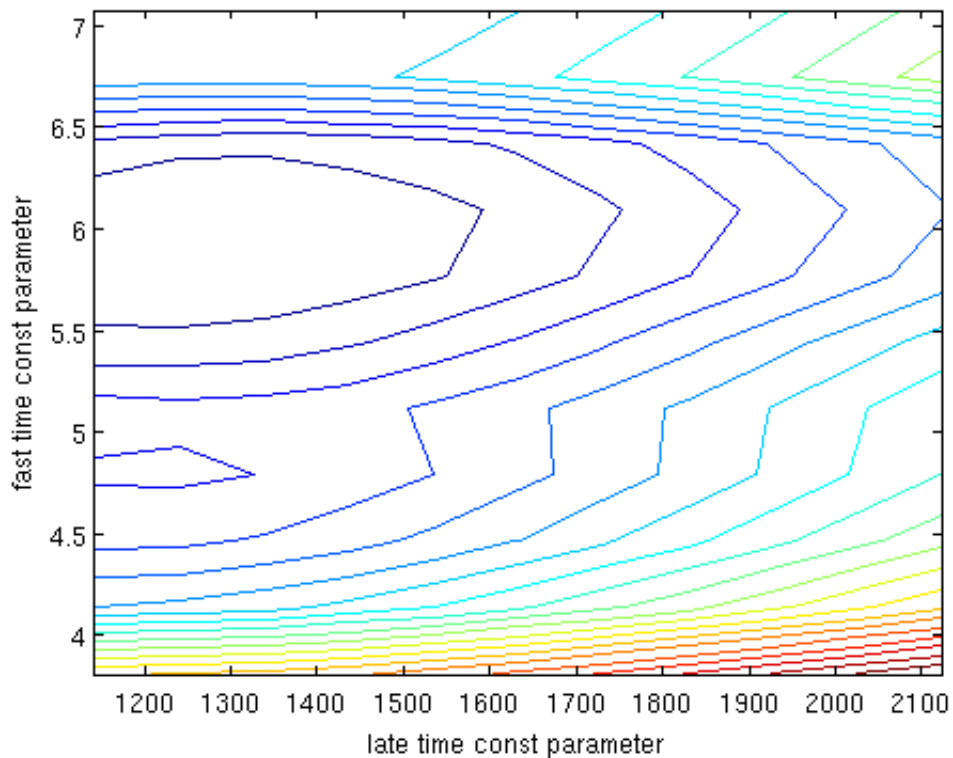
The convolution matches up quite well with the average pulse already, even with just the ROOT fit parameters



2 exponent fits

- We float the amplitude parameters, to reduce our 4D space to 2D
 - For each pair of time constants, take the smallest χ^2 value among the different amplitudes
- Look for a χ^2 local minimum

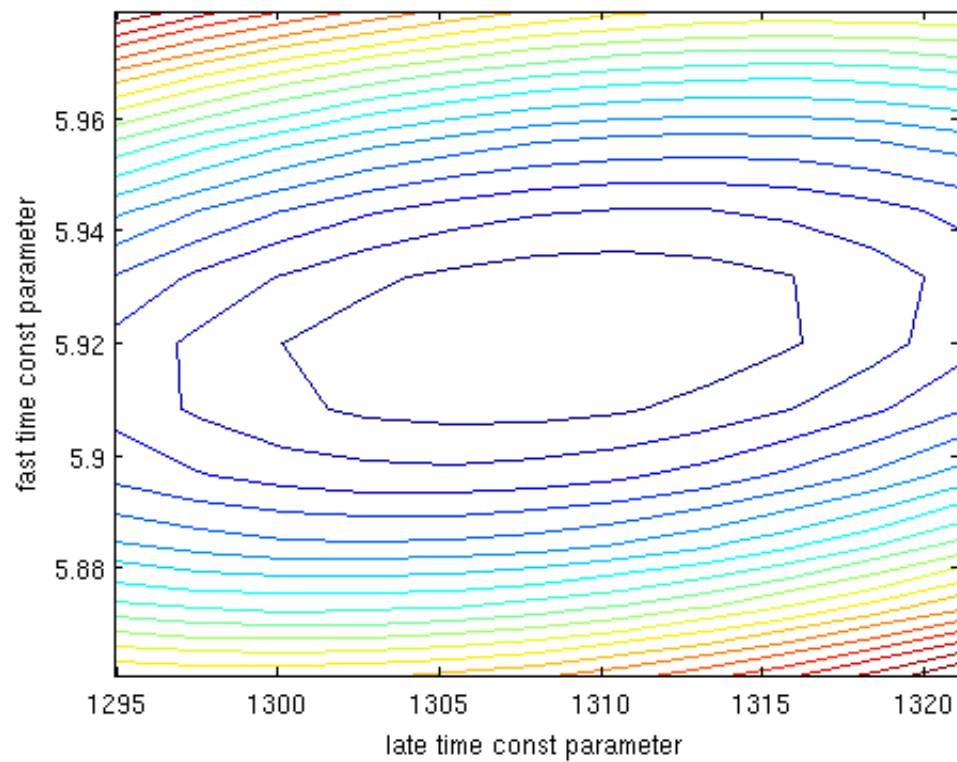
chi² values for 2-exp fit



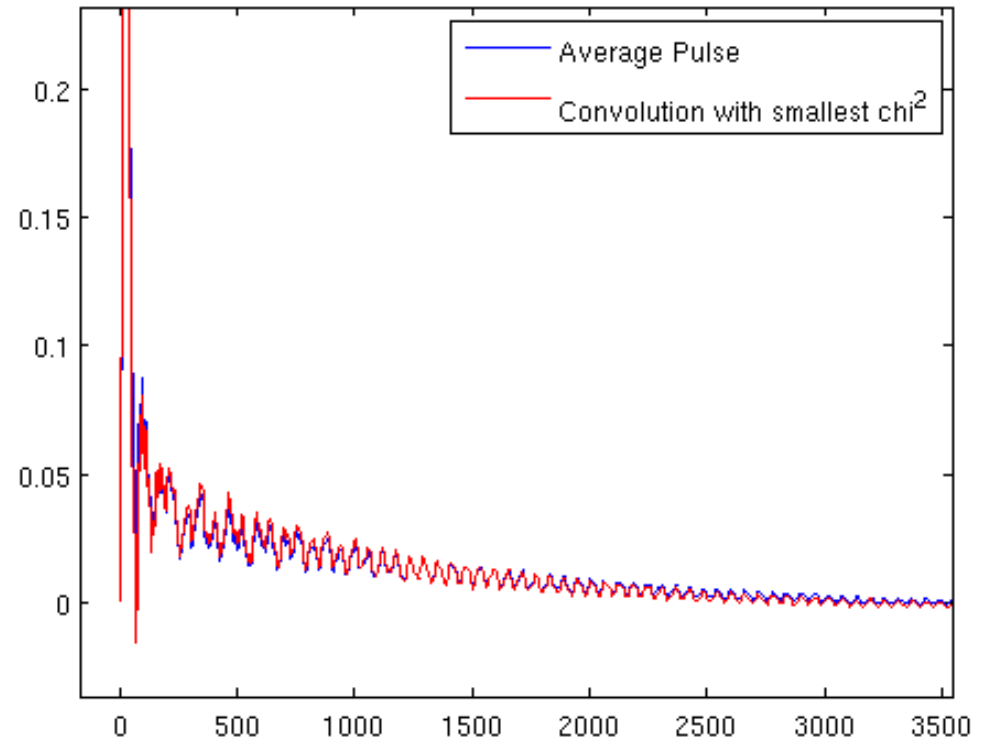
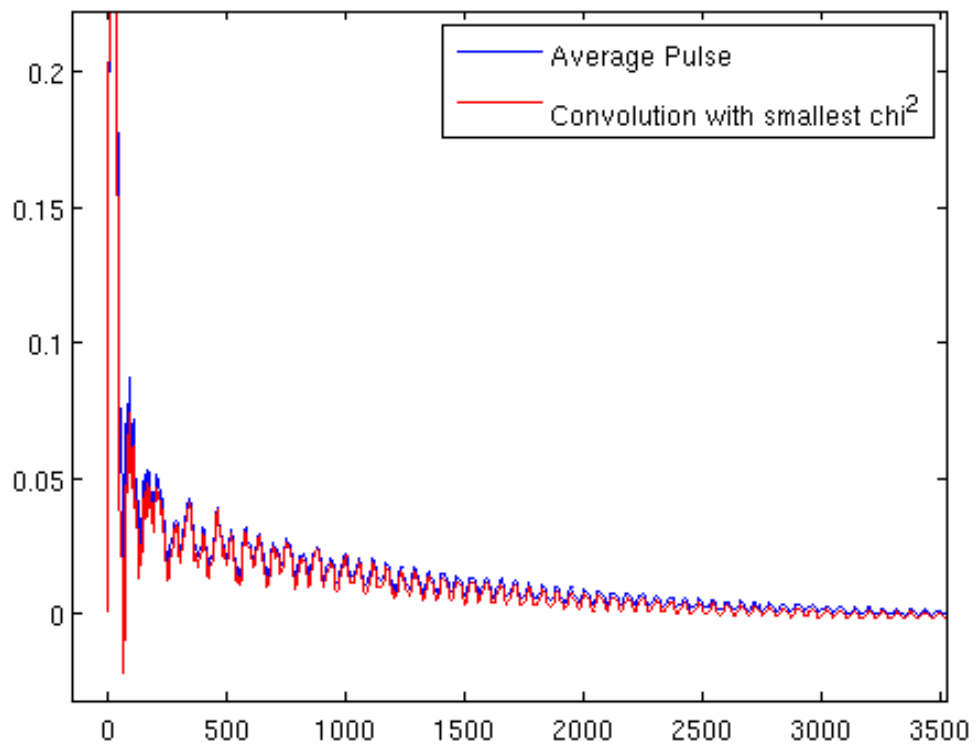
Center at maximum and increase parameter resolution to determine best fit parameters

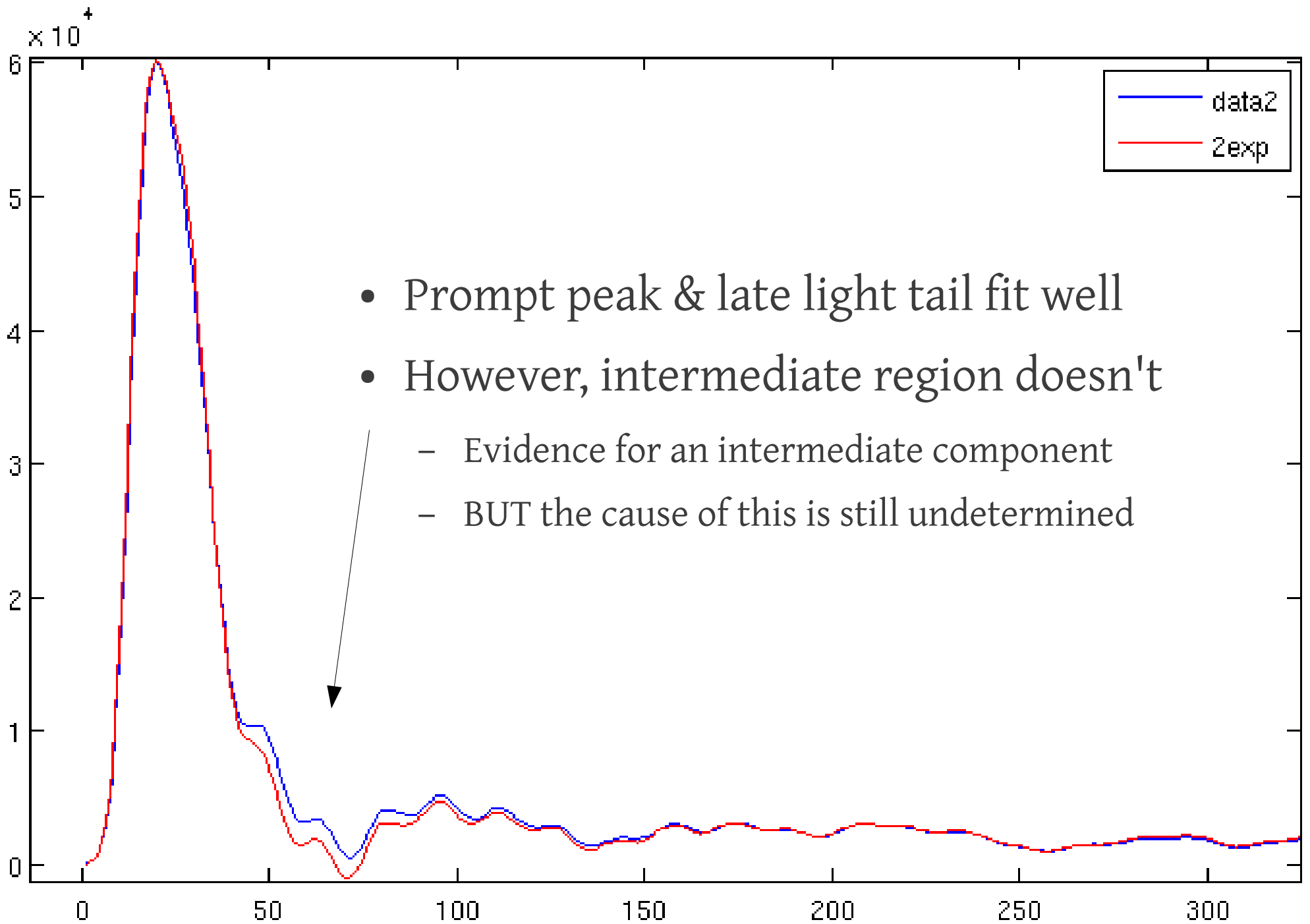
Start with a large parameter space

chi² values for 2-exp fit



Sanity check: can tell by eye that fits are getting better as well

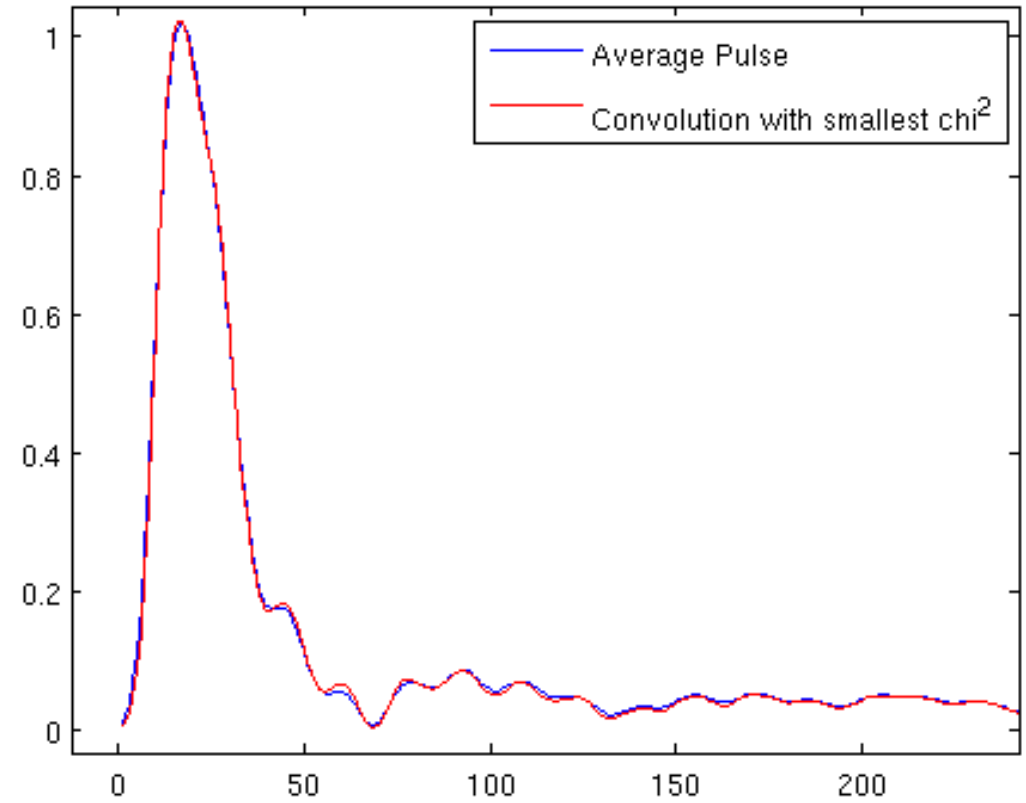
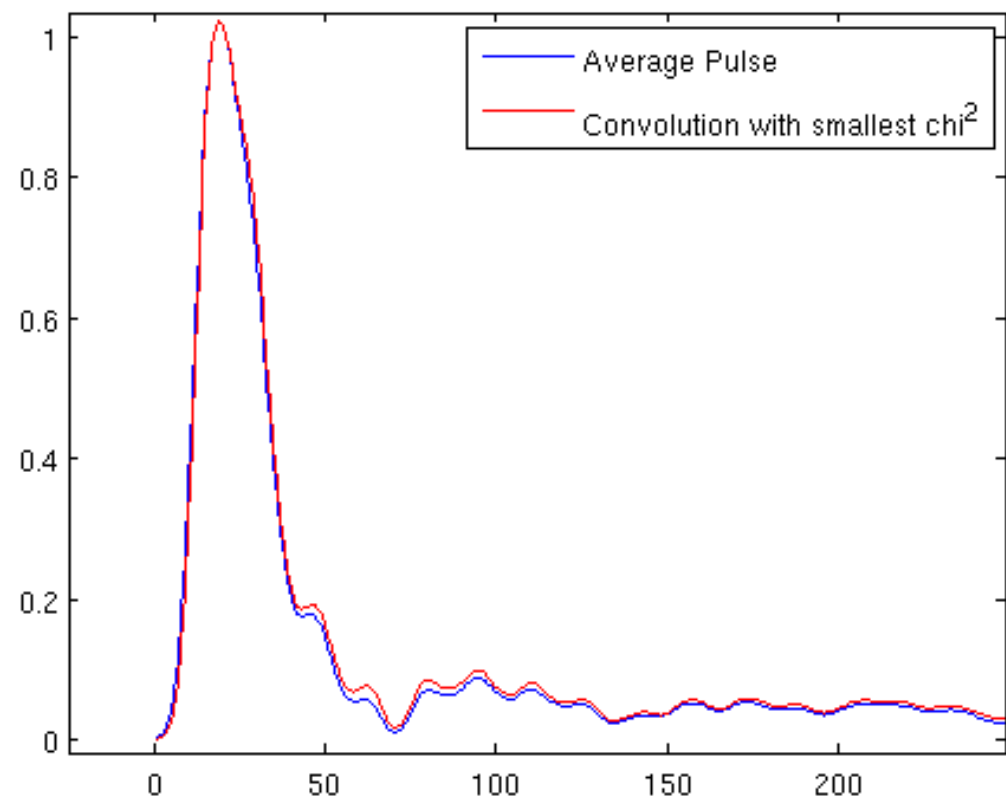


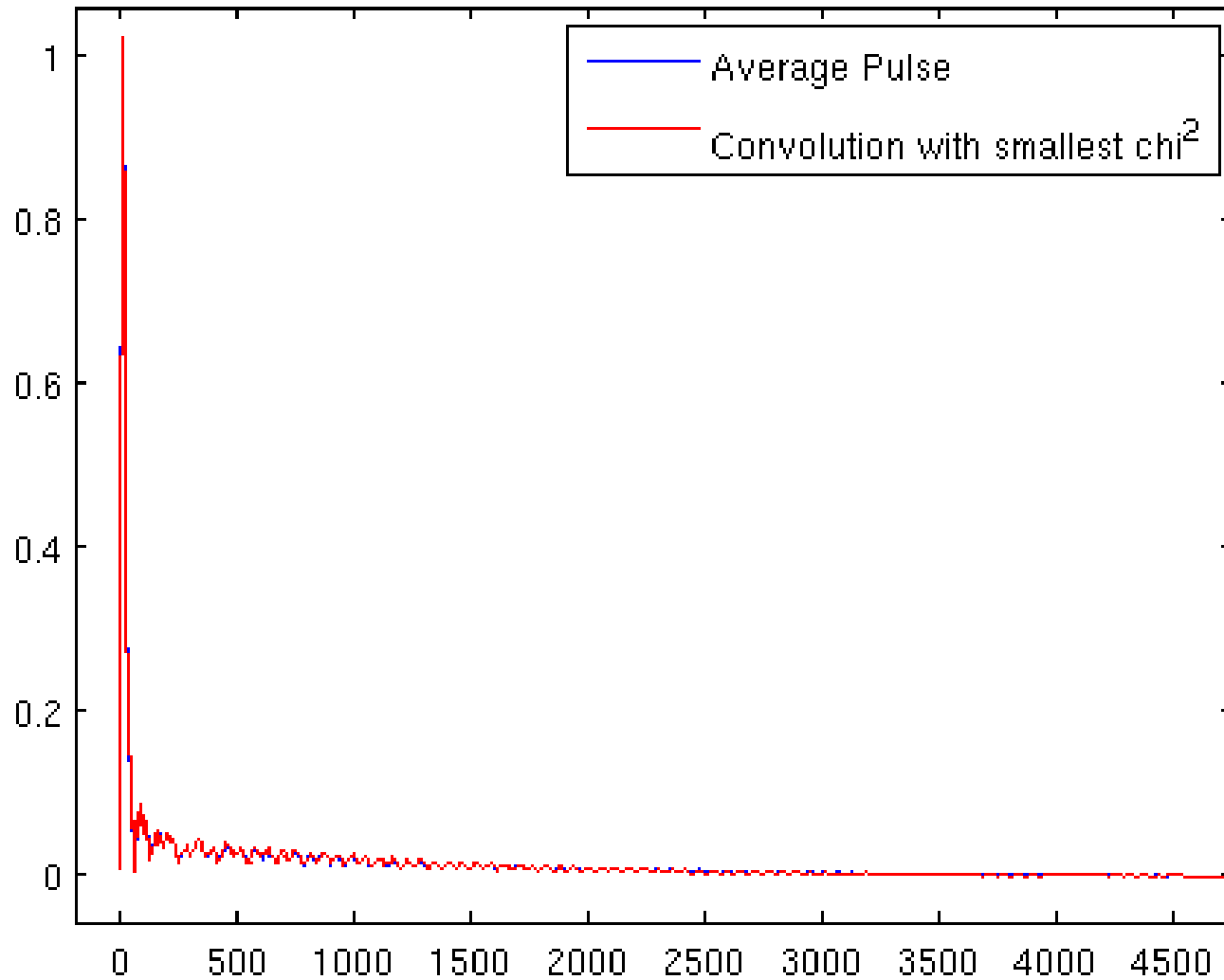


3 exponent fits

- Same as before, but with 6 parameters
 - Float amplitudes again to reduce this down to 3D
 - Output local minimum in this parameter space
- Repeat with new parameters & narrow down in parameter space

Here too, can tell by eye that fits are getting better





- Best 3-exp fit so far
- Time Constants:
 - Late: 1391 ns
 - Int: 23.09 ns
 - Prompt: 3.55 ns

