DOE/NV/25946--1359

# Processing Tons of Data with QuickView

Abel B. Diaz

National Security Technologies, LLC

This work was done by National Security Technologies, LLC, under Contract No. DE-AC52-06NA25946 with the U.S. Department of Energy.

# Outline

- Evolution of the QuickView software
- FYI
- Questions

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data

② No analysis

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data

② ~~No analysis~~ FFTs

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data

② FFTs

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick

# Software Goals

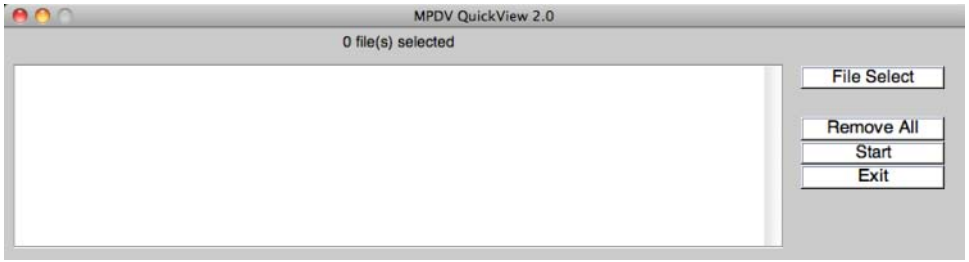
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals

# Software Goals

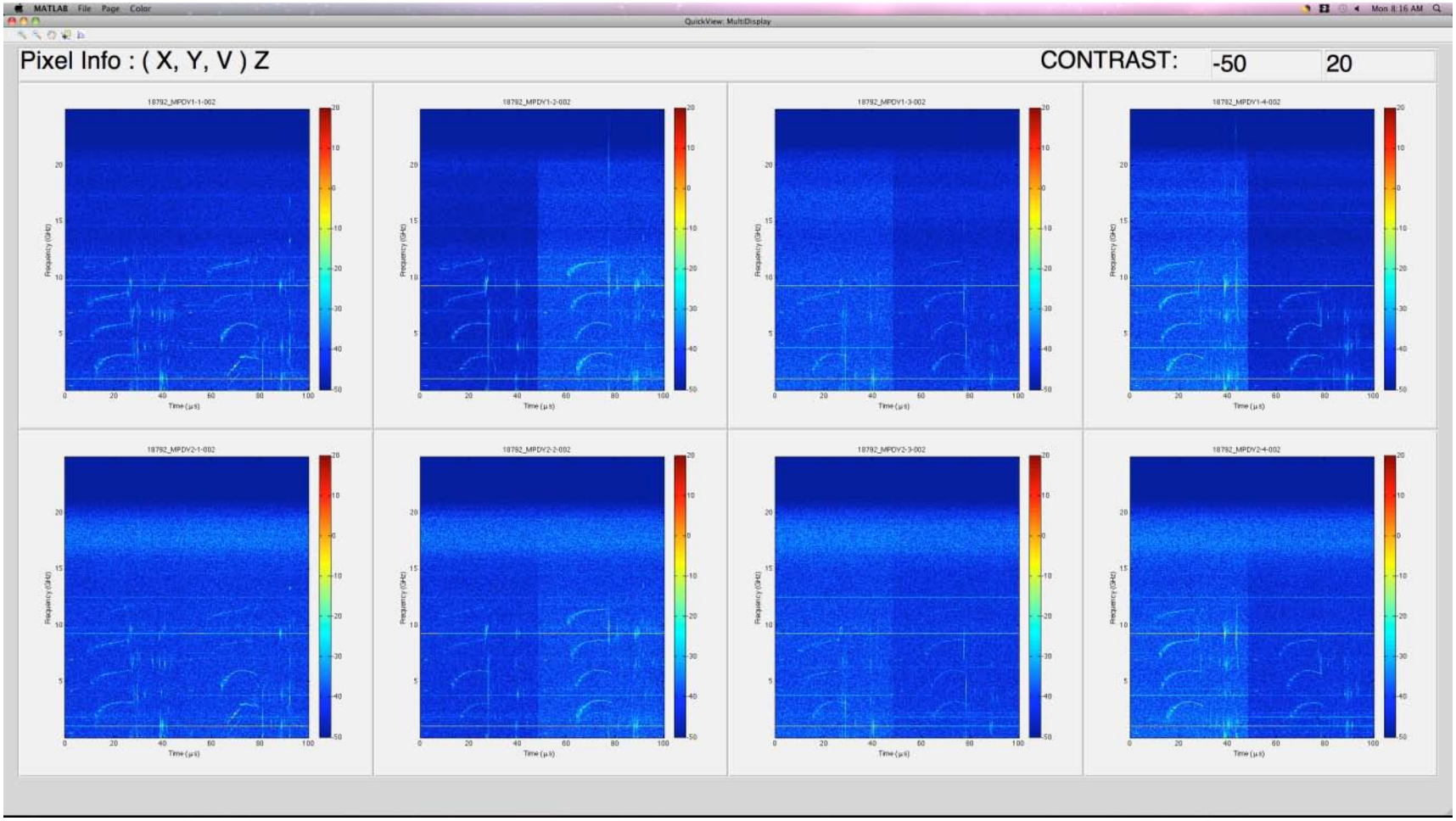
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)

# QuickView

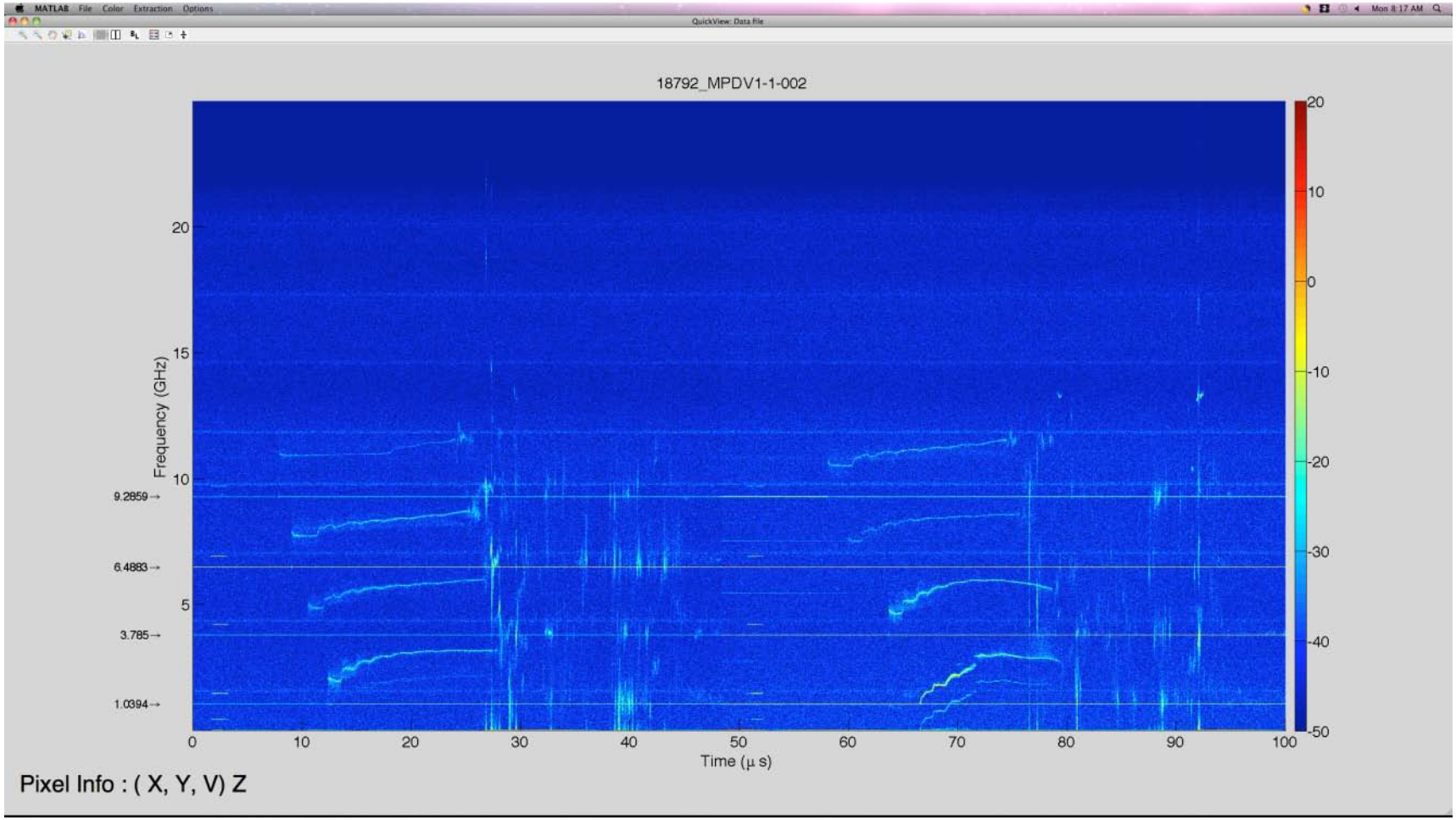
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast



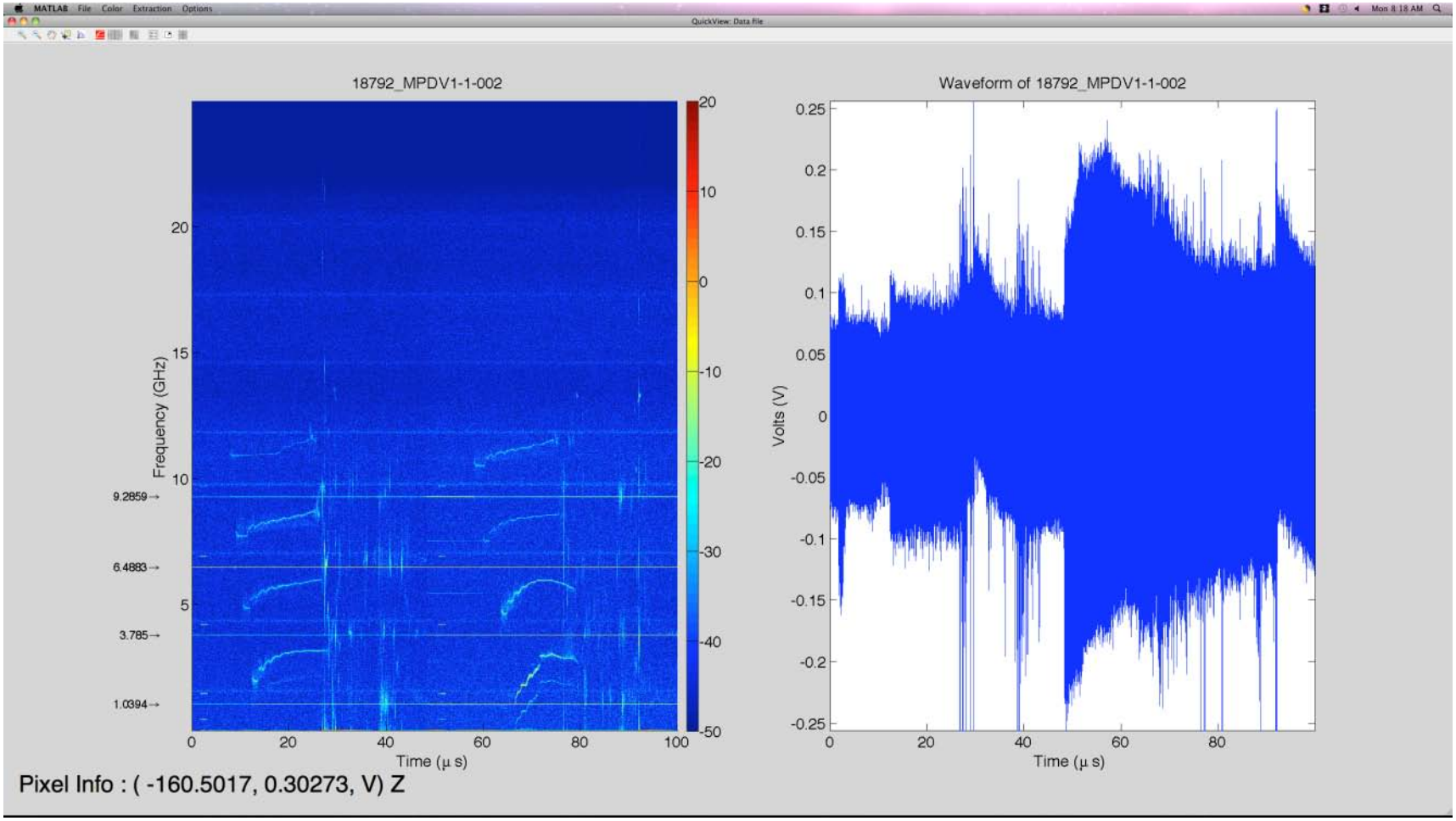
# QuickView


MATLAB File Page Color
QuickView: MultiDisplay
Pixel Info : ( X, Y, V ) Z
CONTRAST:
-50
20
18792_MPDV1-1-002
18792_MPDV1-2-002
18792_MPDV1-3-002
18792_MPDV1-4-002
18792_MPDV2-1-002
18792_MPDV2-2-002
18792_MPDV2-3-002
18792_MPDV2-4-002
Frequency (GHz)
Time (μs)

# QuickView


MATLAB File Color Extraction Options
QuickView: Data File
18792_MPDV1-1-002
Frequency (GHz)
9.2859
6.4883
3.785
1.0394
Time (μ s)
Pixel Info : ( X, Y, V) Z

# QuickView


MATLAB File Color Extraction Options
QuickView: Data File
18792_MPDV1-1-002
Frequency (GHz)
Time (μ s)
9.2859
6.4883
3.785
1.0394
Waveform of 18792_MPDV1-1-002
Volts (V)
Time (μ s)
Pixel Info : ( -160.5017, 0.30273, V) Z

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen

- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

# Software Goals

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen

- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

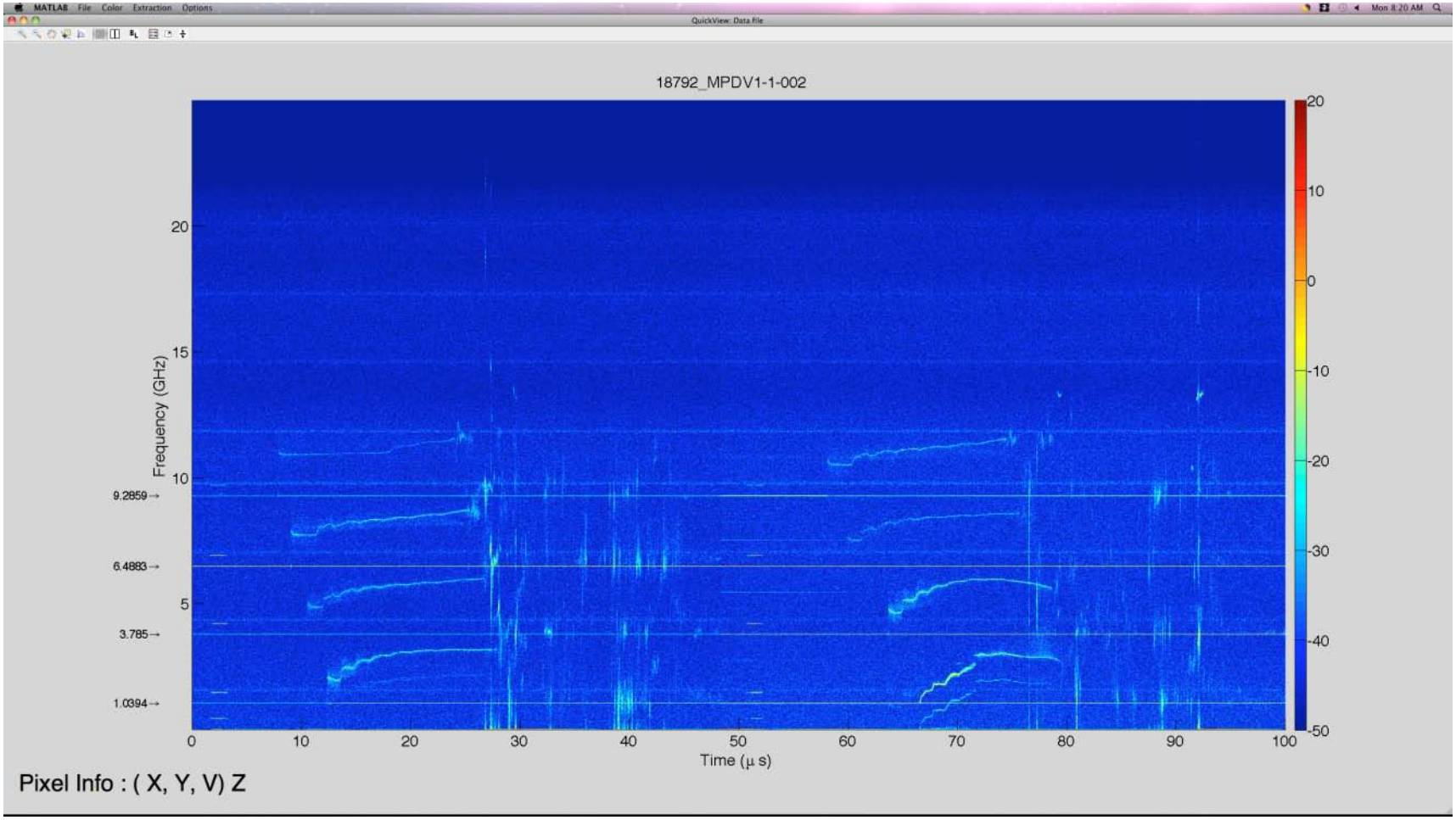
This is great…but you know what would be nice…

# Software ~~Goals~~ Wants

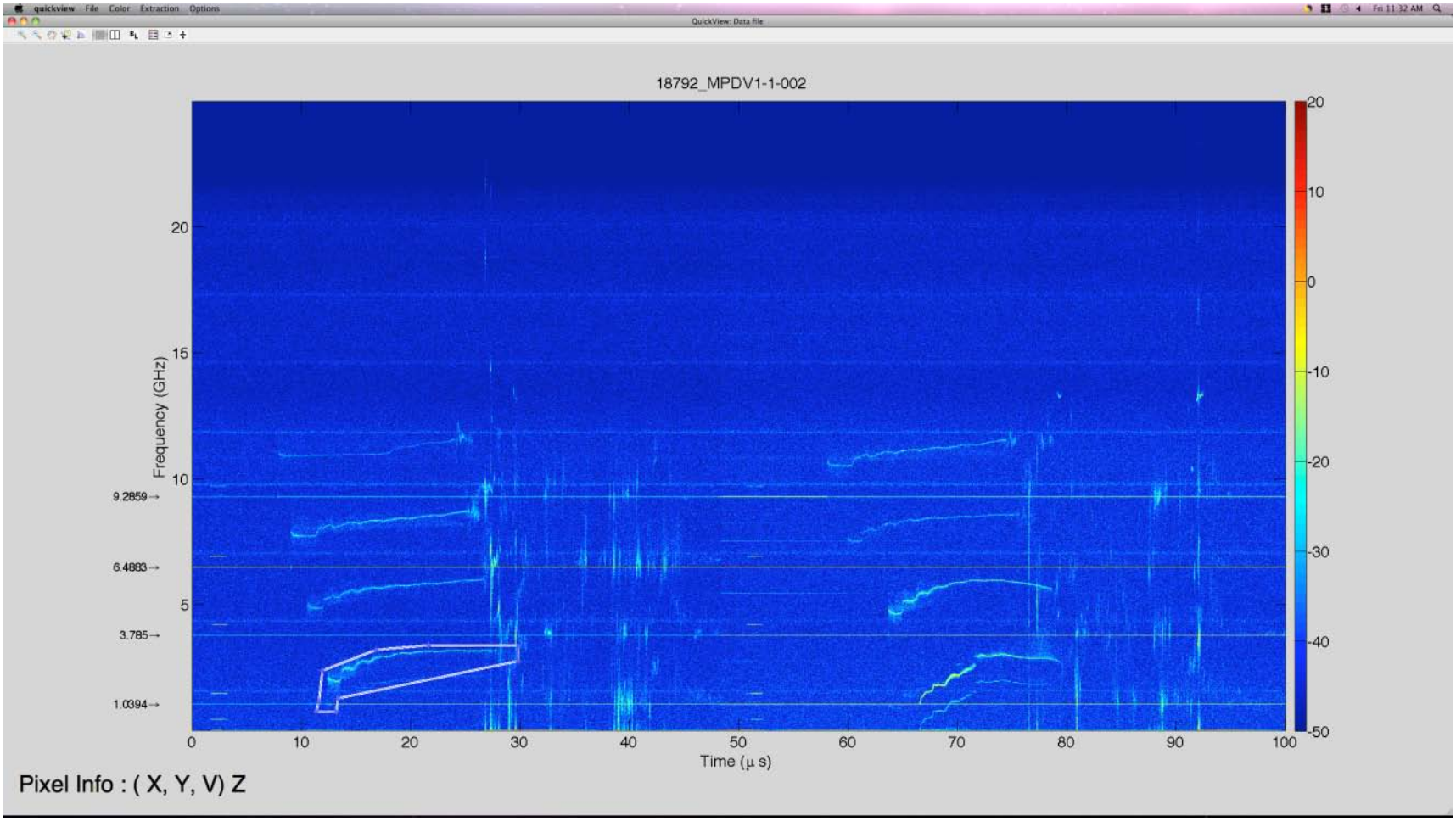
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction

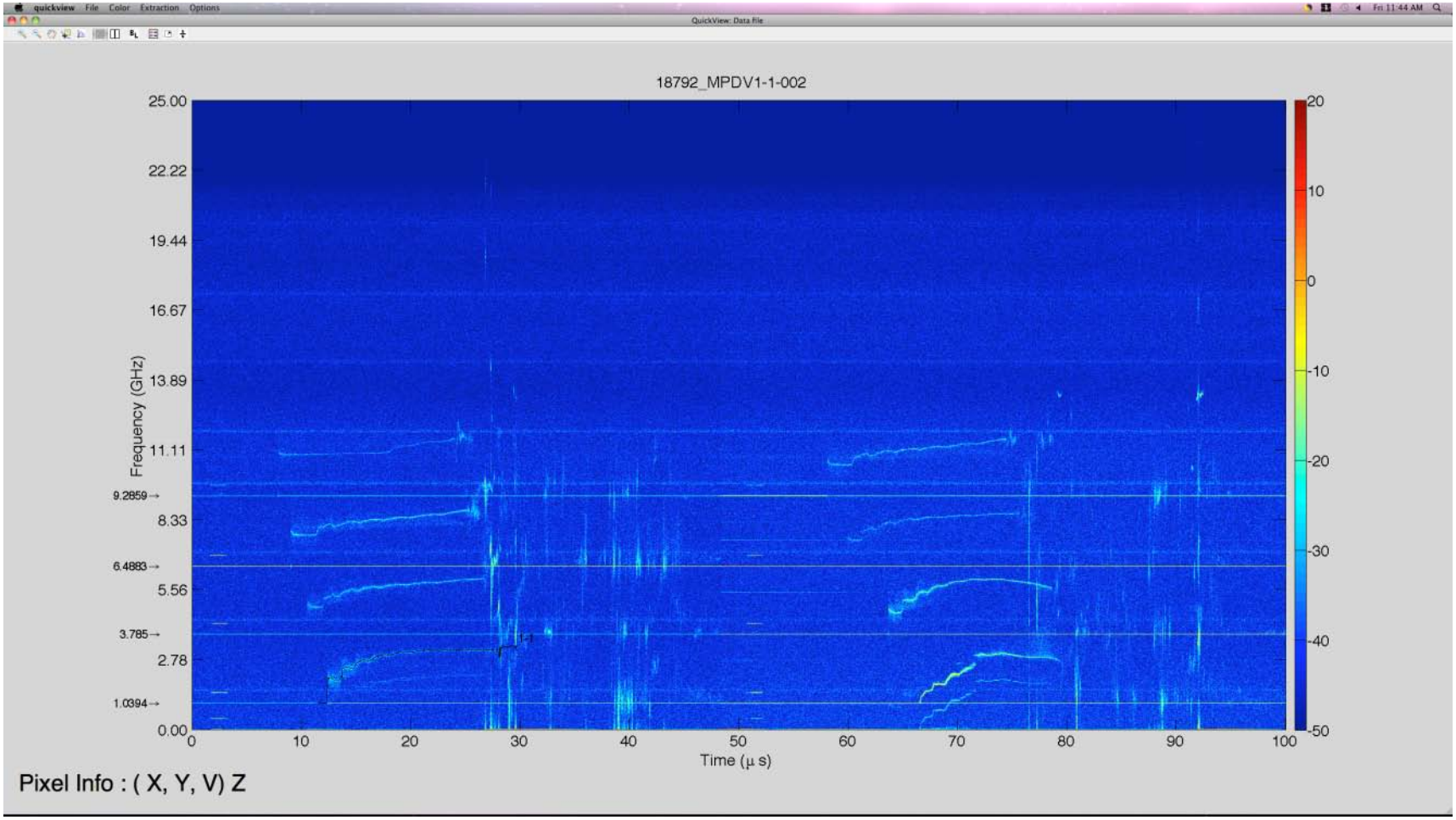
# Velocity Extraction



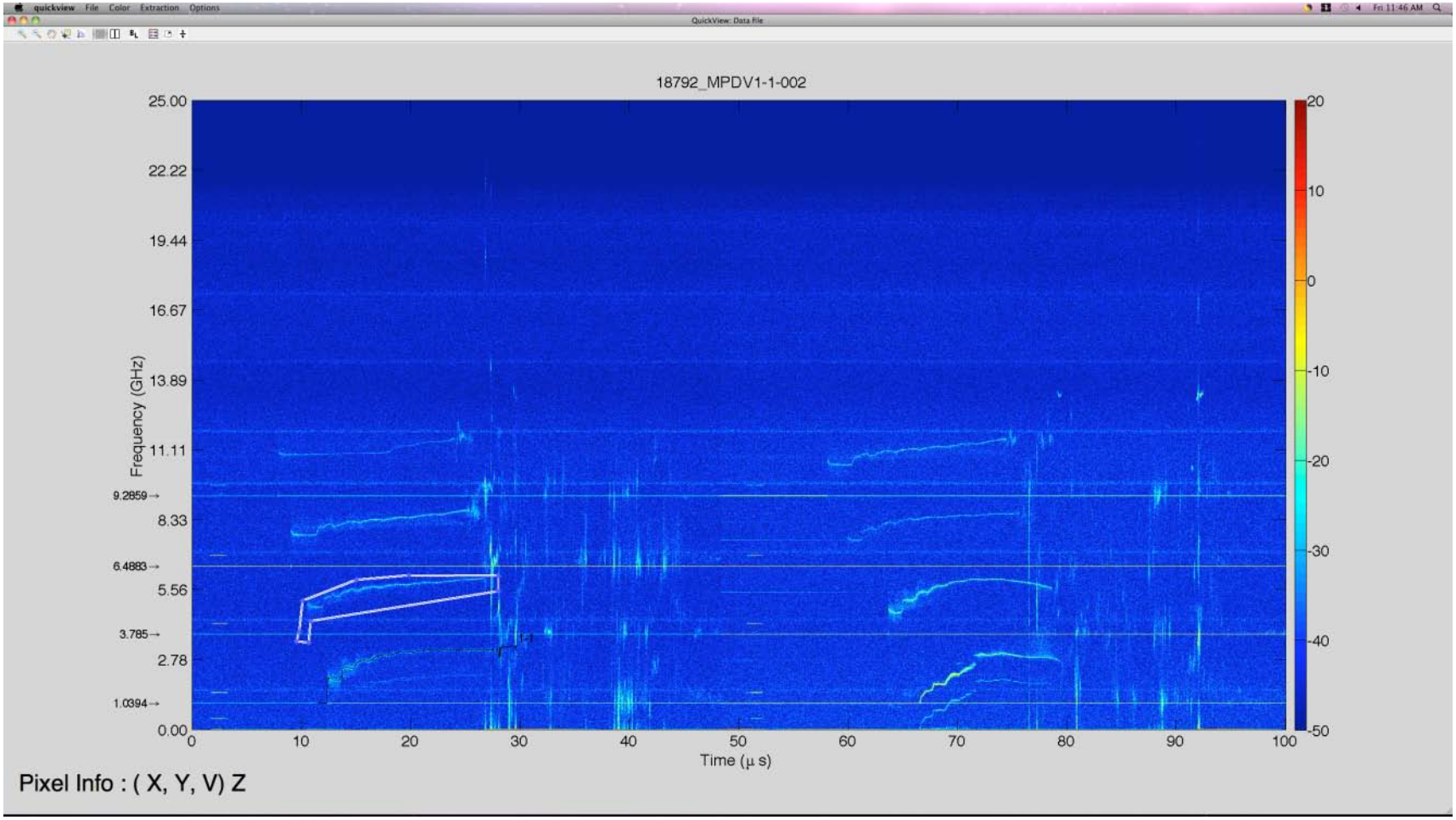
# Velocity Extraction



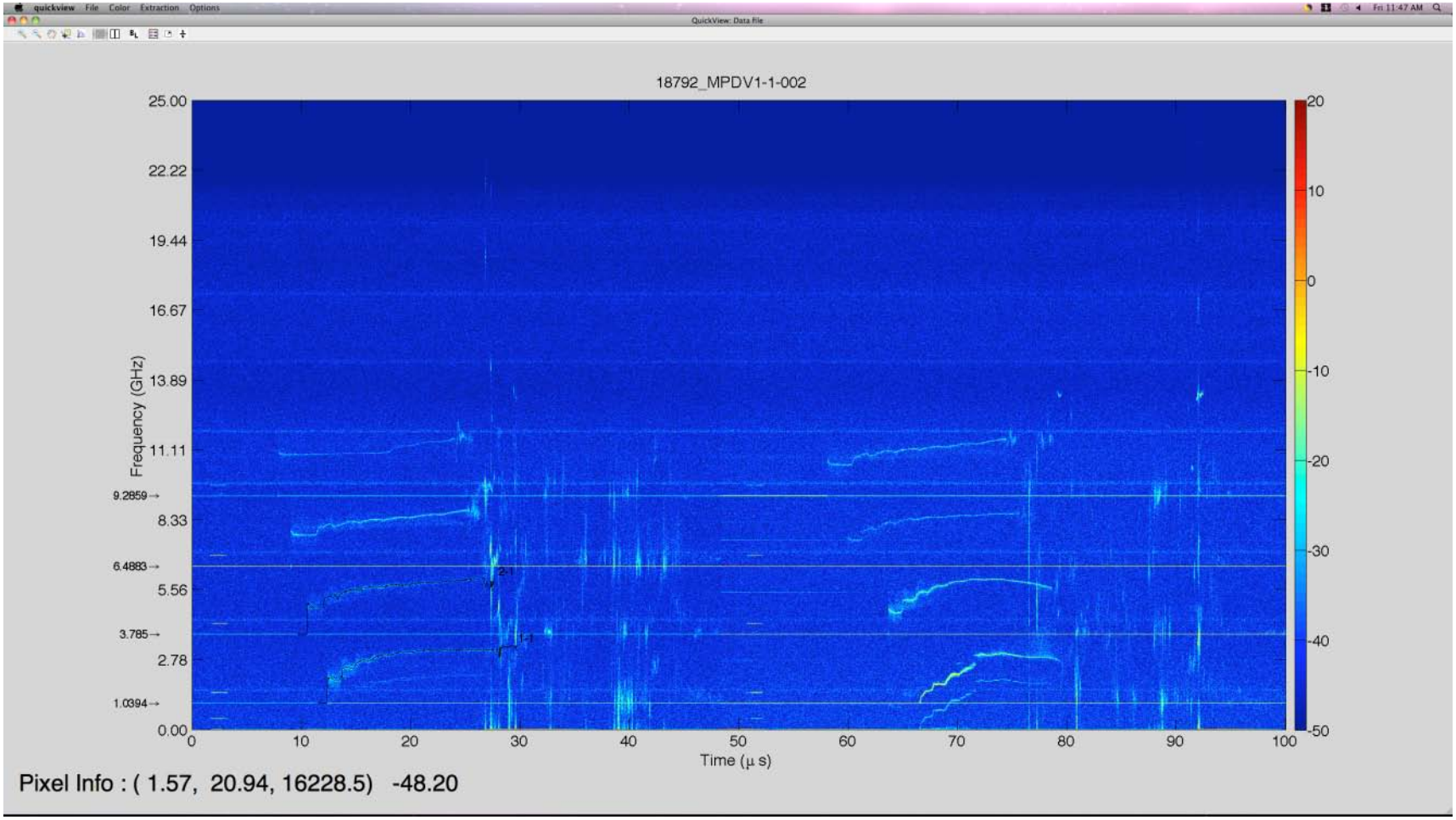
# Velocity Extraction



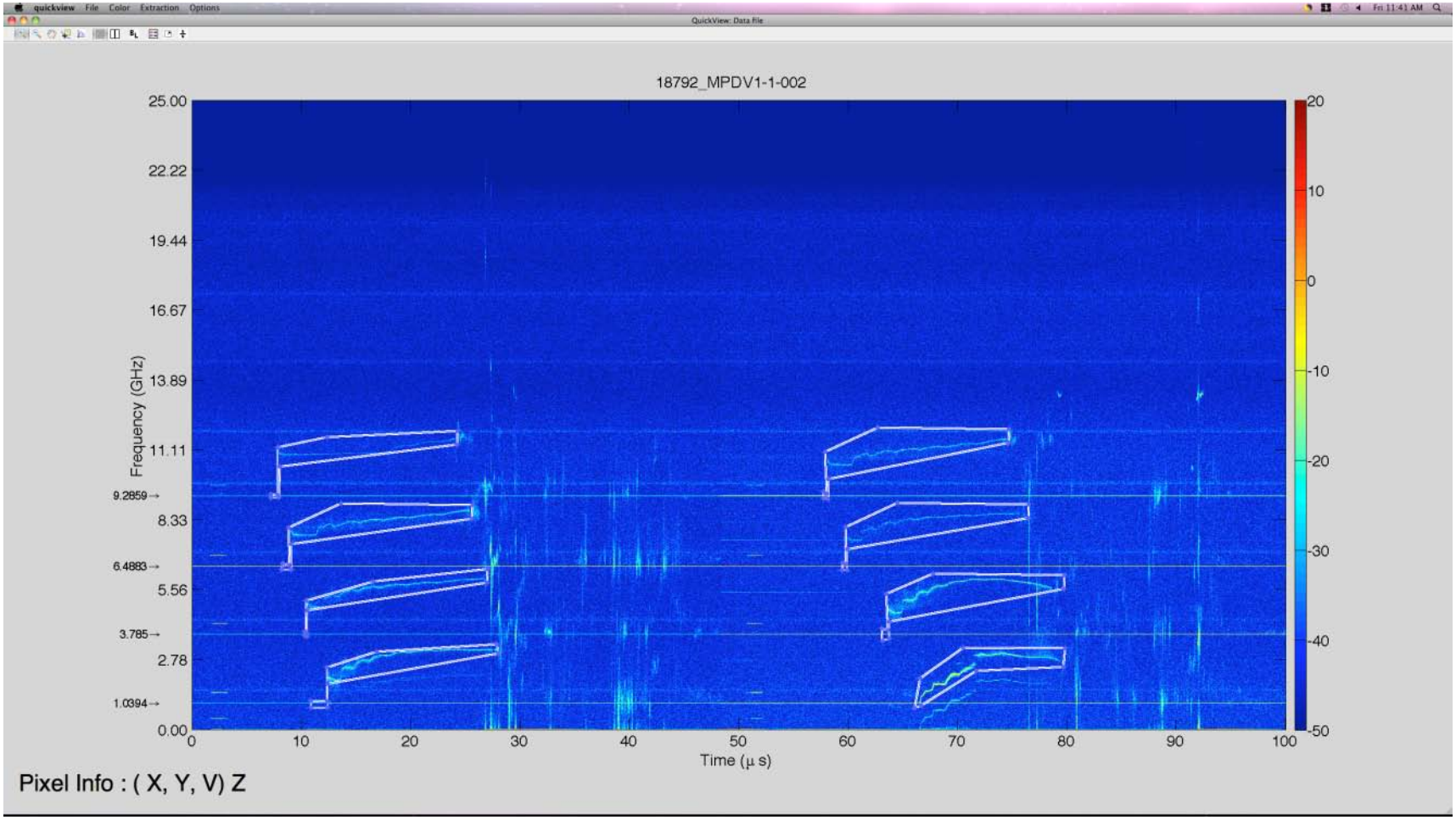
# Velocity Extraction



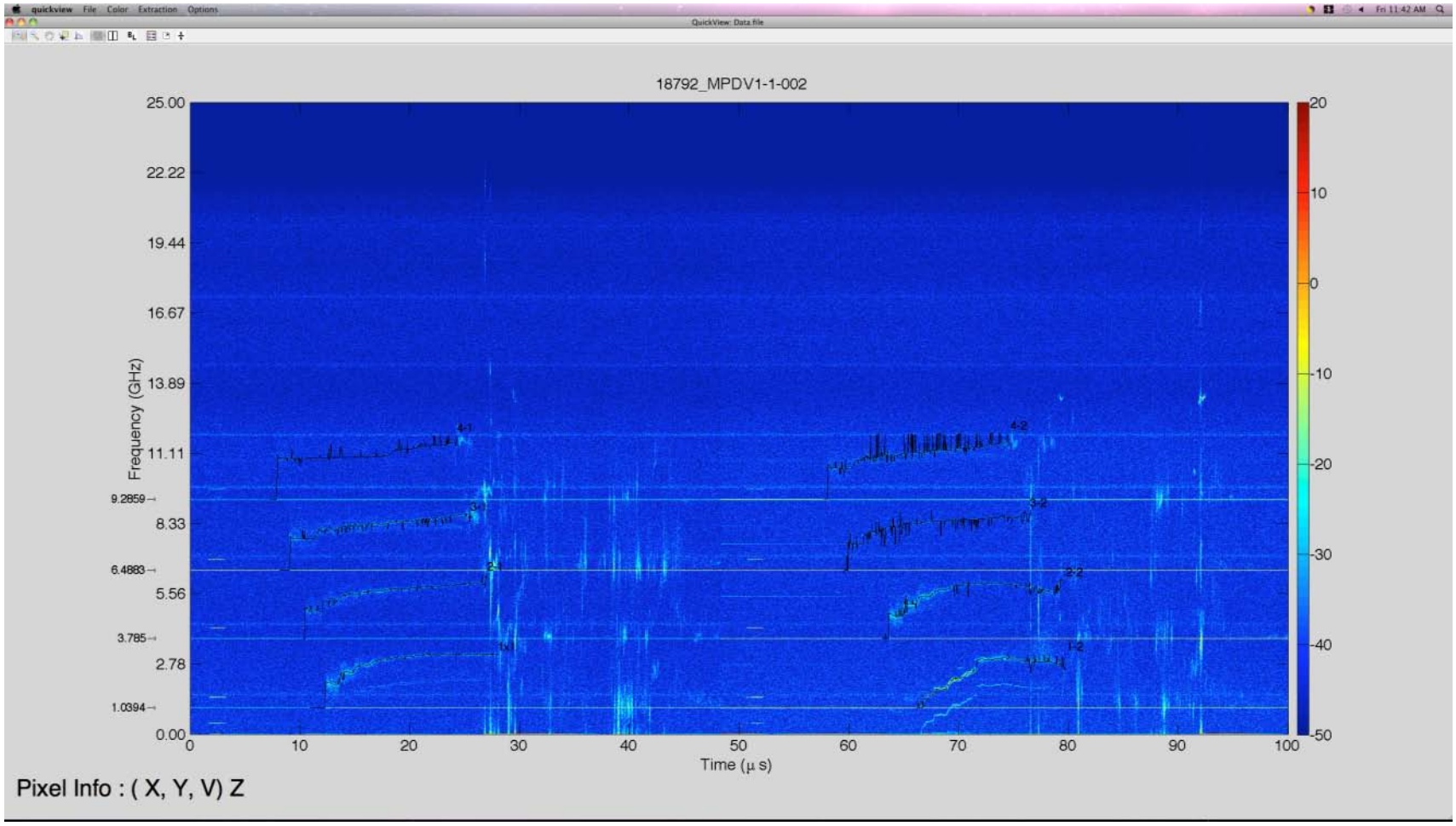
# Velocity Extraction



# Velocity Extraction



# Velocity Extraction



# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction

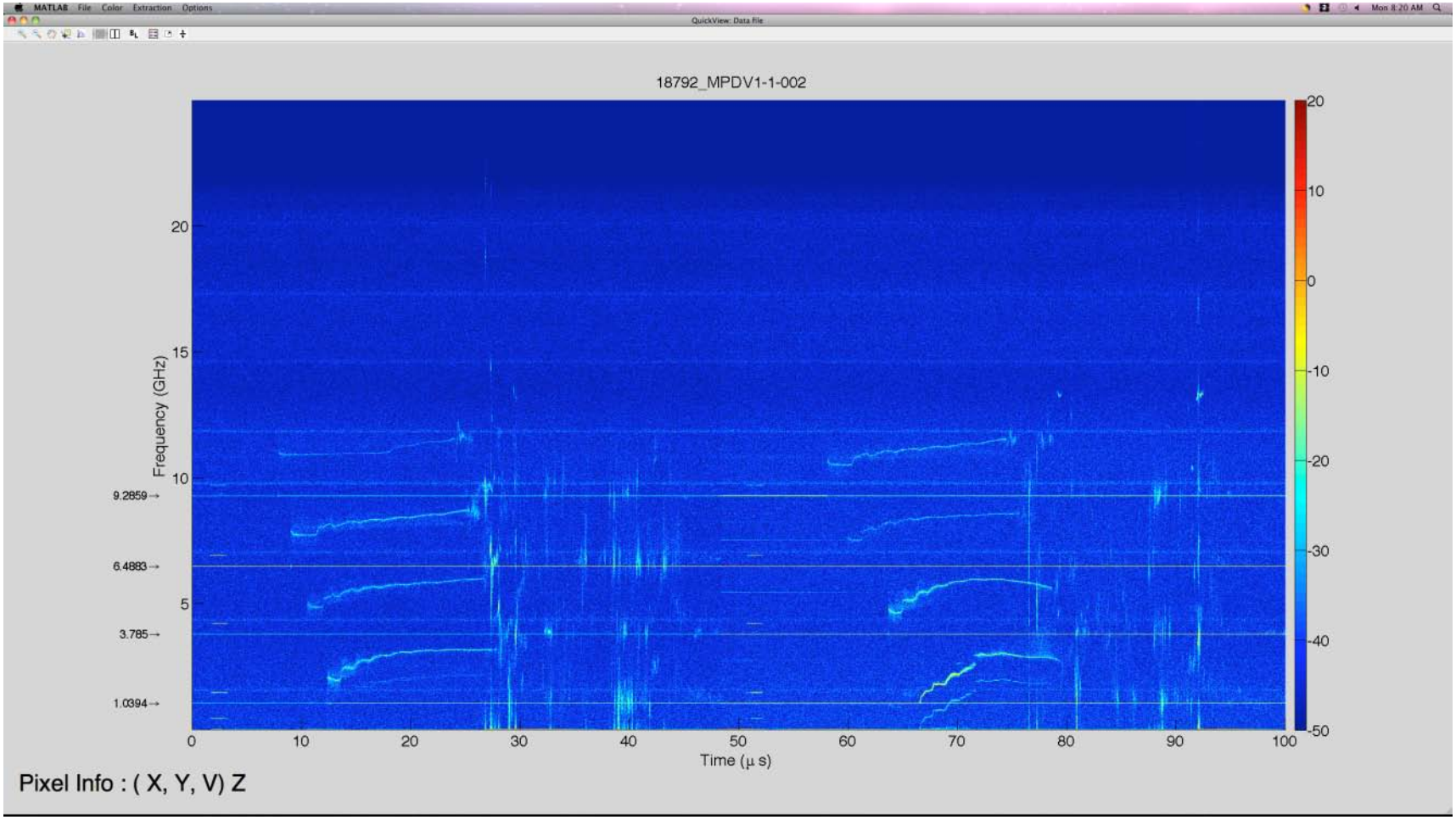
This is great…but you know what would be nice…

# Software ~~Goals~~ Wants

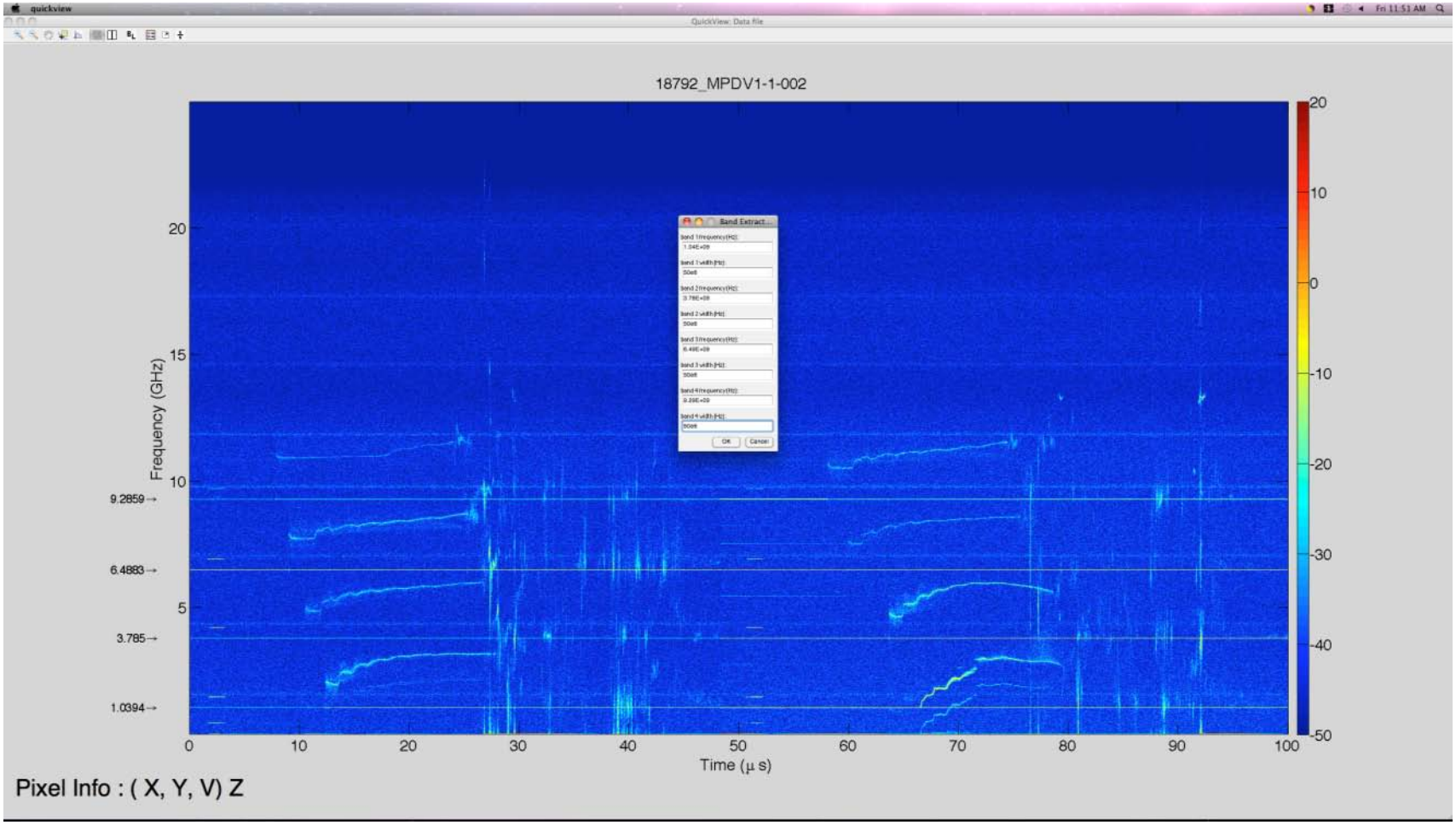
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering

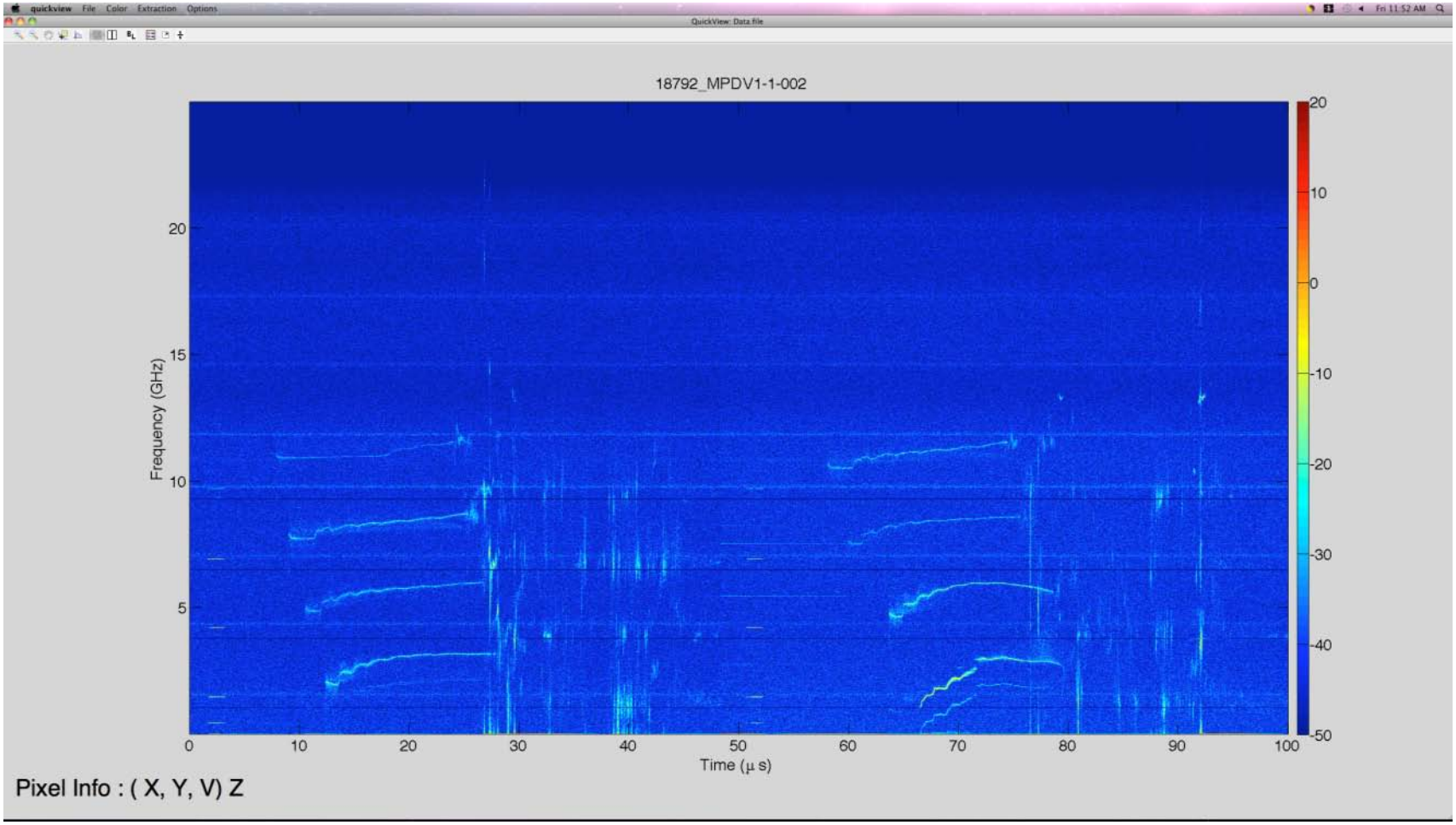
# Band-Pass Filtering



# Band-Pass Filtering



# Band-Pass Filtering



# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering

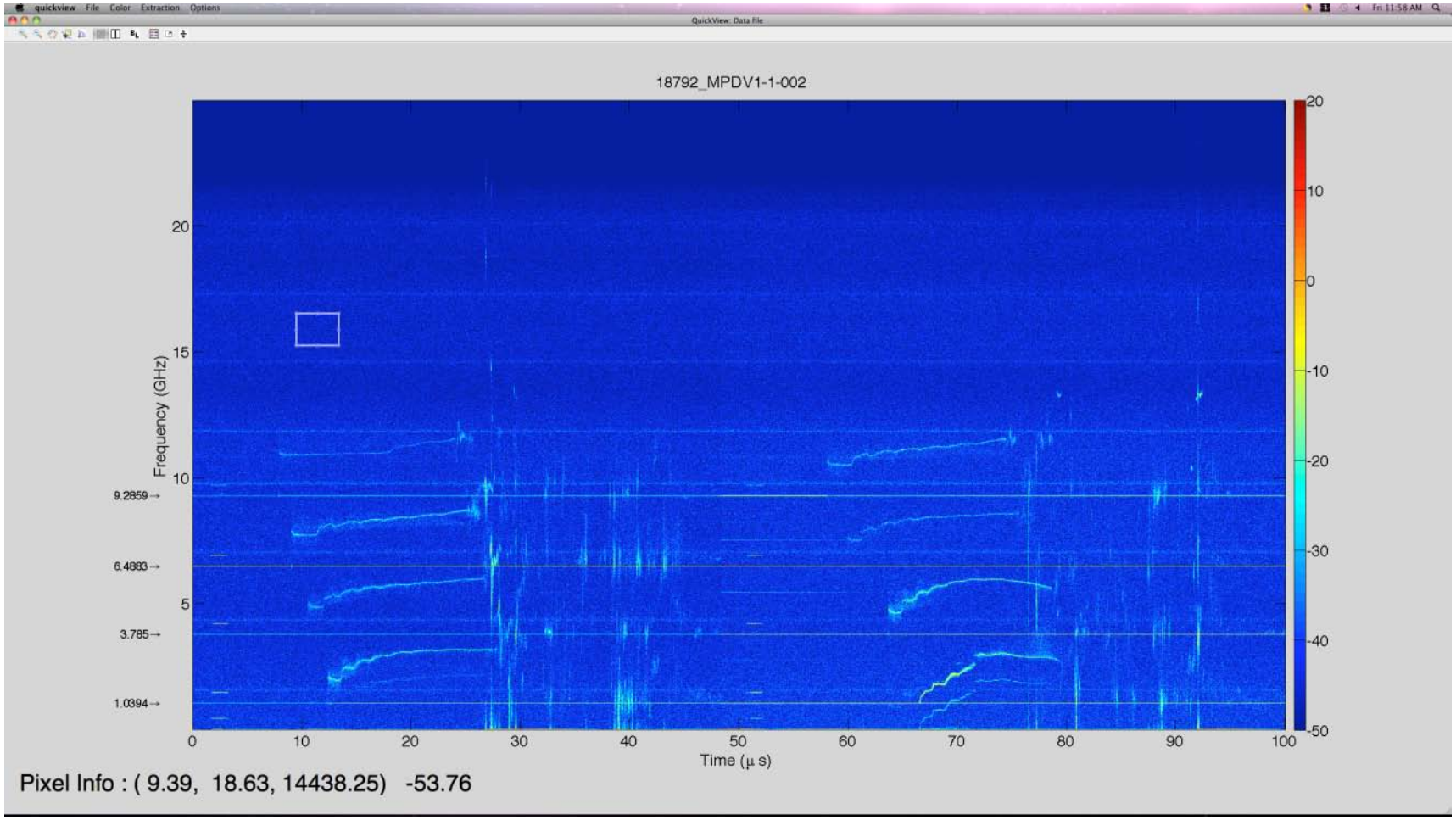
This is great…but you know what would be nice…

# Software ~~Goals~~ Wants

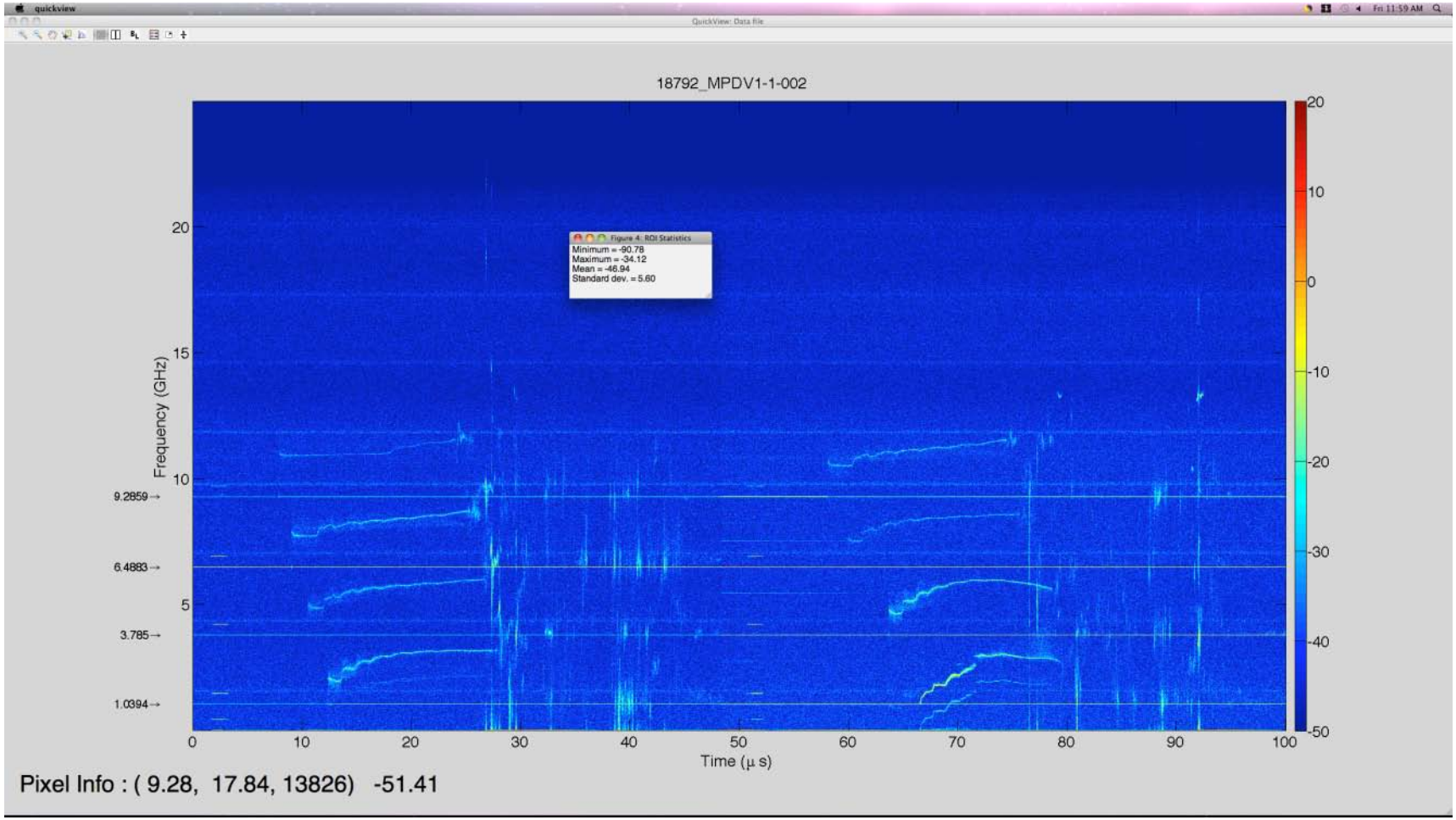
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats

# ROI STATS


quickview File Color Extraction Options
QuickView: Data File
18792_MPDV1-1-002
Frequency (GHz)
9.2859
6.4883
3.785
1.0394
Time (μ s)
Pixel Info : ( 9.39, 18.63, 14438.25) -53.76

# ROI STATS


quickview
QuickView: Data File
18792_MPDV1-1-002
Figure 4: ROI Statistics
Minimum = -90.78
Maximum = -34.12
Mean = -46.94
Standard dev. = 5.60
Frequency (GHz)
9.2859
6.4883
3.785
1.0394
Time (μ s)
Pixel Info : ( 9.28, 17.84, 13826) -51.41

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats

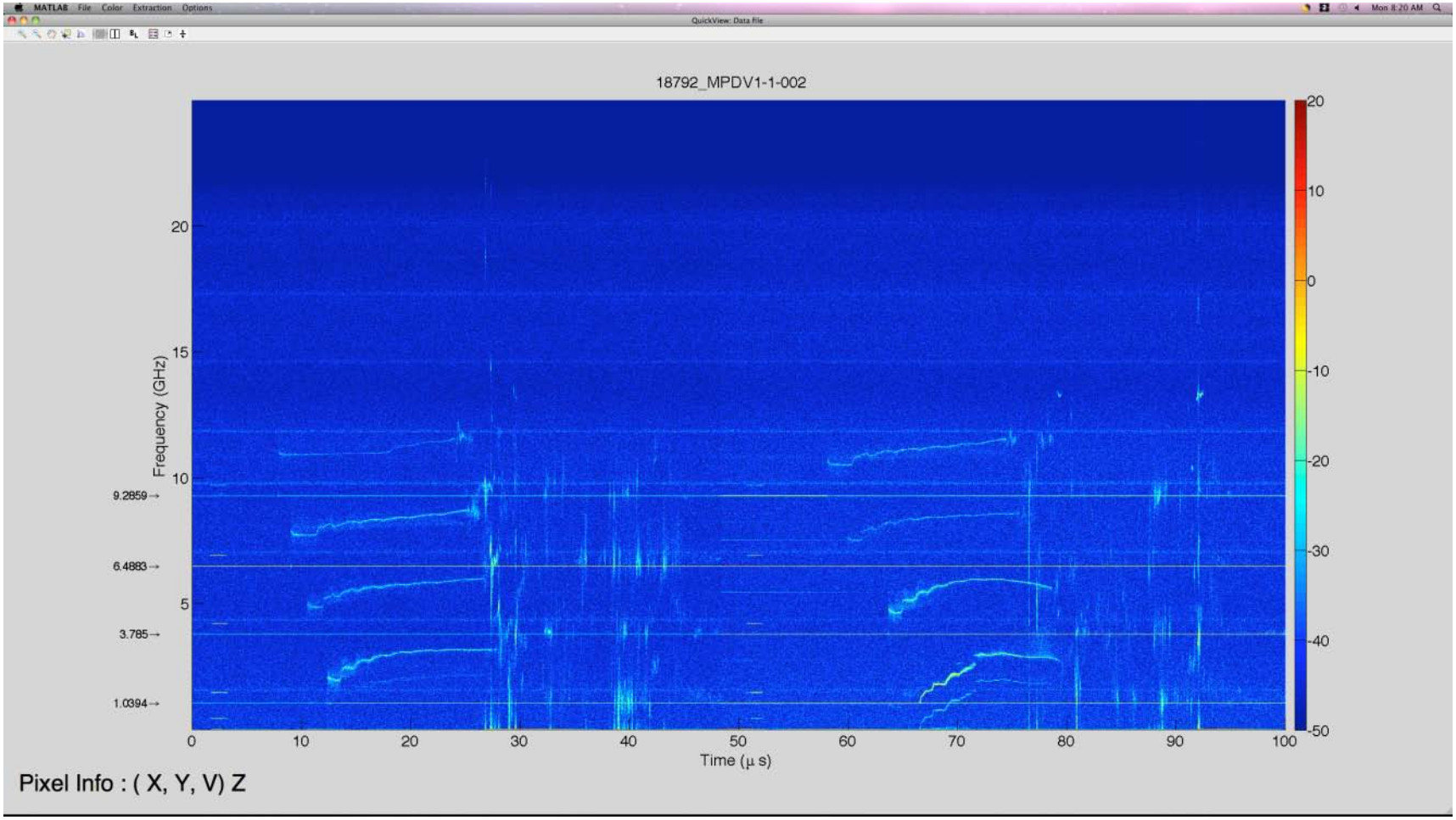
This is great…but you know what would be nice…

# Software ~~Goals~~ Wants

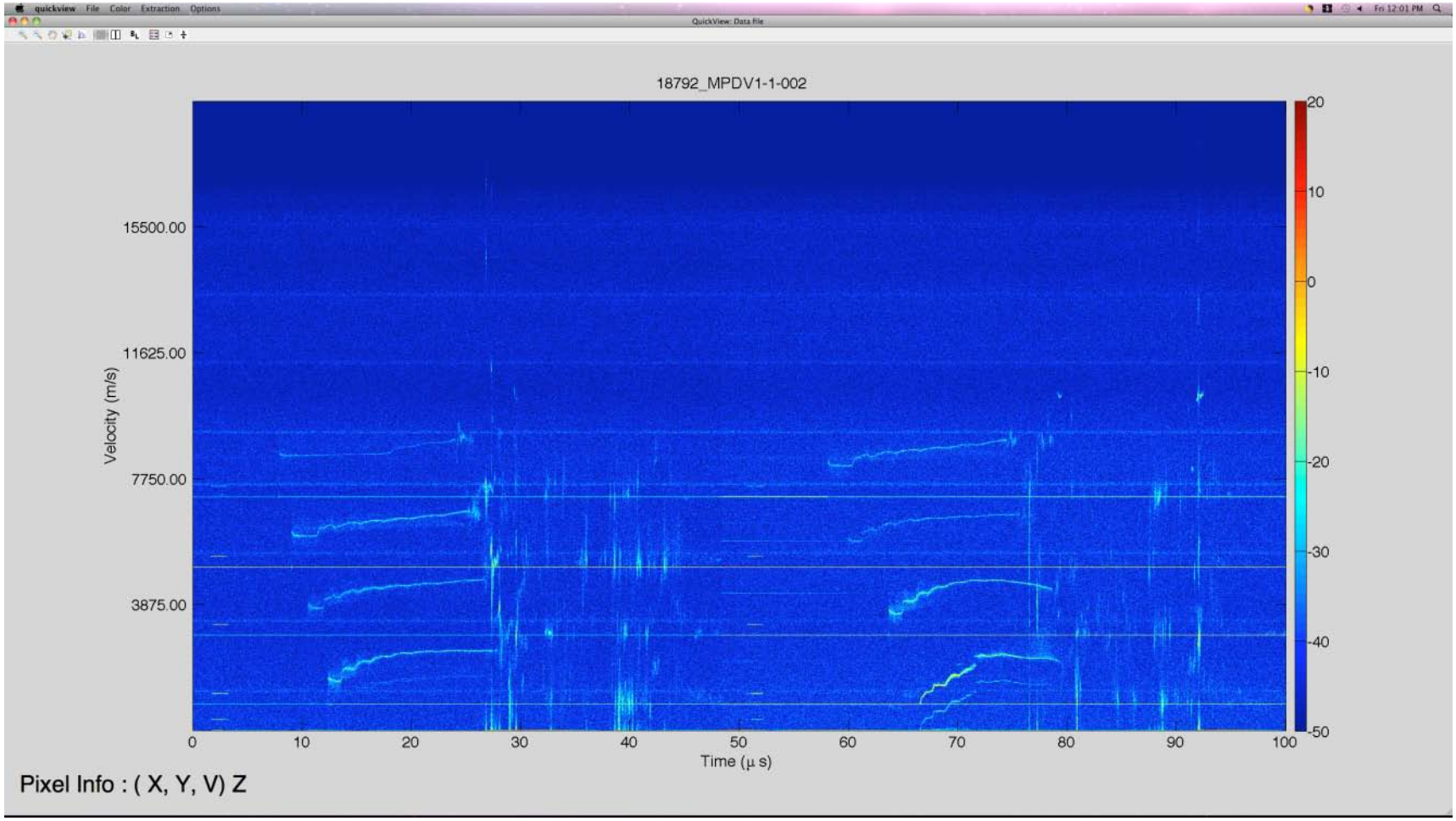
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes

# Vertical Axis



# Vertical Axis



# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes

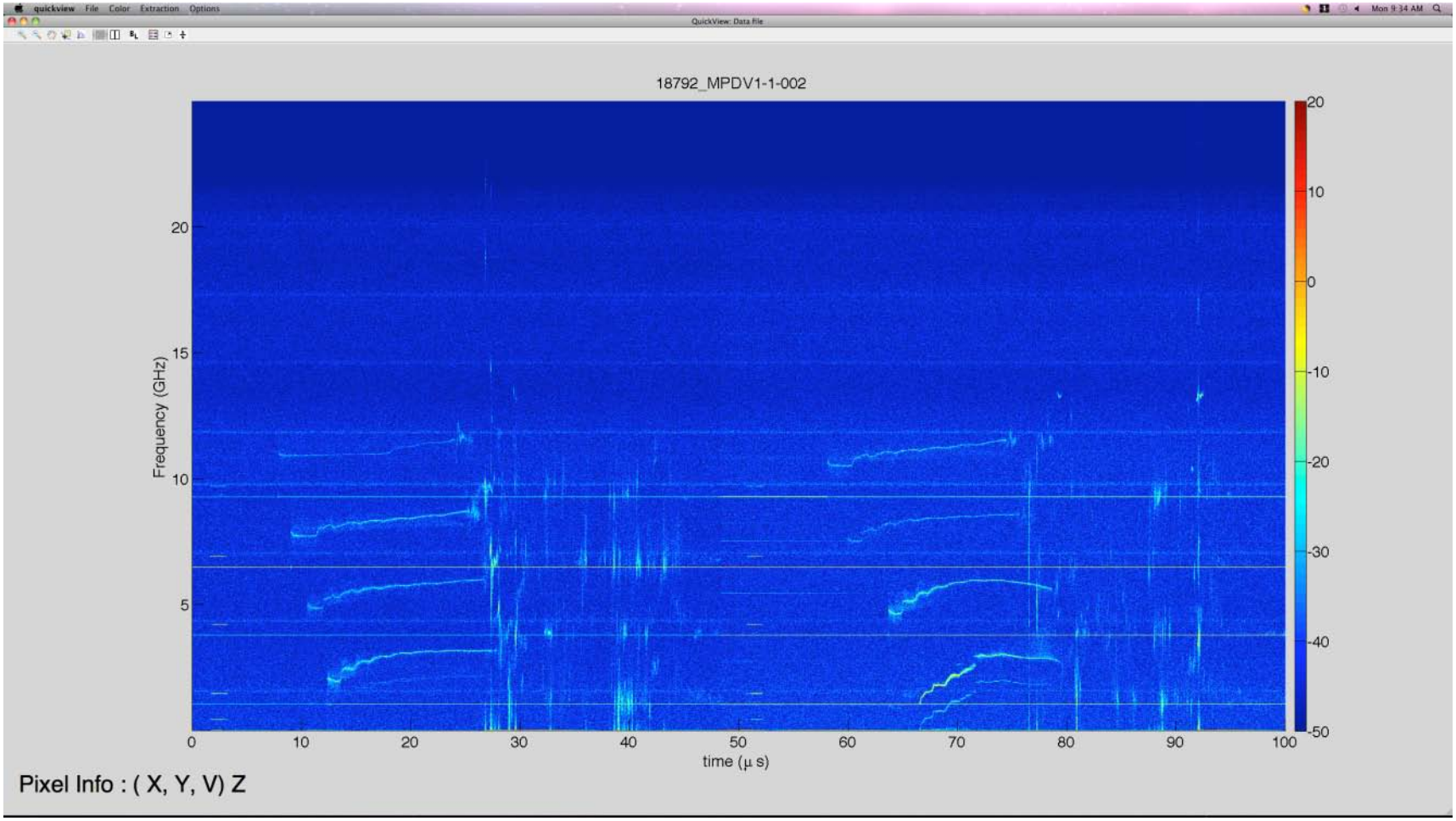
This is great…but you know what would be nice…

# Software ~~Goals~~ Wants

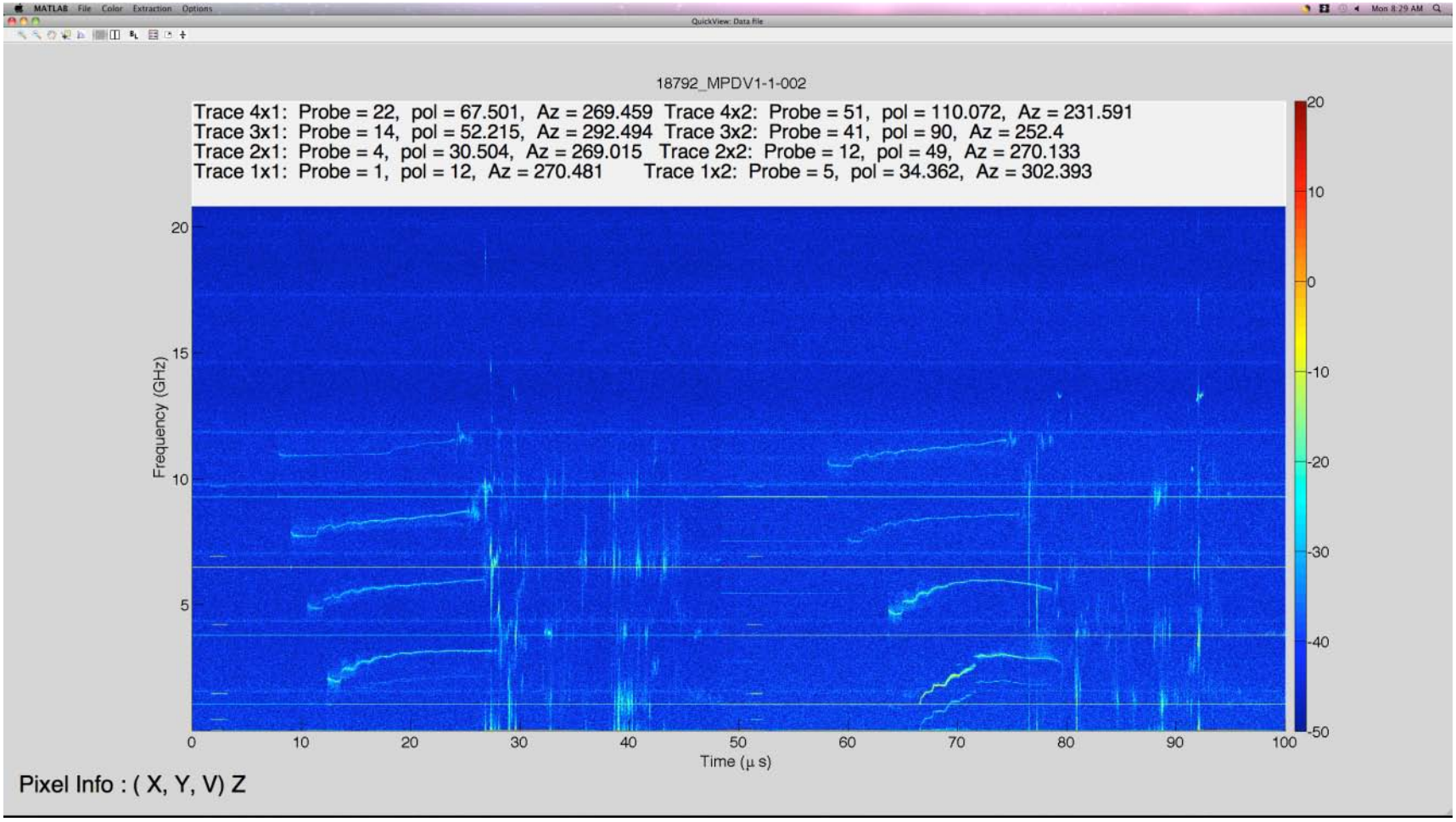
① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes
⑪ Legend (log file)

# Legend


quickview File Color Extraction Options
QuickView: Data File
Mon 9:34 AM
18792_MPDV1-1-002
Frequency (GHz)
time (μs)
Pixel Info : ( X, Y, V) Z

# Legend


MATLAB File Color Extraction Options
QuickView: Data File
Mon 8:29 AM
18792_MPDV1-1-002
Trace 4x1: Probe = 22, pol = 67.501, Az = 269.459 Trace 4x2: Probe = 51, pol = 110.072, Az = 231.591
Trace 3x1: Probe = 14, pol = 52.215, Az = 292.494 Trace 3x2: Probe = 41, pol = 90, Az = 252.4
Trace 2x1: Probe = 4, pol = 30.504, Az = 269.015 Trace 2x2: Probe = 12, pol = 49, Az = 270.133
Trace 1x1: Probe = 1, pol = 12, Az = 270.481 Trace 1x2: Probe = 5, pol = 34.362, Az = 302.393
Frequency (GHz)
20
15
10
5
0
10
20
30
40
50
60
70
80
90
100
Time (μ s)
20
10
0
-10
-20
-30
-40
-50
Pixel Info : ( X, Y, V) Z

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes
⑪ Legend (log file)

# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes
⑪ Legend (log file)

This is great…but you know what would be nice…

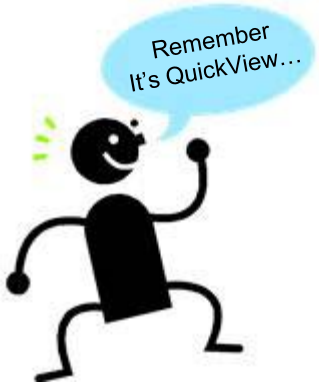
# Software ~~Goals~~ Wants

① Provide eye-catching visuals (pretty pictures) of multiplex PDV data
② FFTs
③ Quick
④ Lots of PDV signals
⑤ Save plots (jpeg or pdf)
⑥ Split screen
- Basic image exploration
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction
⑧ Band-pass filtering
⑨ ROI Stats
⑩ Switch vertical axes
⑪ Legend (log file)

# Thanks for the Feedback

Sonny Gallegos, Edward Daykin, David HoltKamp, Mike Furlanetto, Jeremy Danielson, Thomas Tunnell, Ted Strand, Carlos Perez, Eric Machorro, and Robert Berglin.



# QuickView Information

- It will run with 2 GB of CPU memory (but more is better)
- Looks nice on a laptop (but larger is better)
- Written with MatLab (and toolboxes)
- View up to 320 PDV signals
  - 5 pages of 8 data sets ➔ 40 data files
  - If data are 4 × 2 multiplexed ➔ 320 PDV signals

# Questions

## Software ~~Goals~~ wants wish list

① Provide eye-catching visuals (pretty pictures) of ~~multiplex~~ any PDV data
② FFT's
③ ~~Quick~~ instantaneous
④ ~~Lots of~~ ∞ PDV signals
⑤ Save plots (~~jpeg or pdf~~ all formats) so it can go into power point or pdf
⑥ Split screen
- Basic image exploration with touch pad options
  - Zoom in/out, pan
  - Cursor readout
  - Color table, contrast

⑦ Velocity extraction with no gaps
⑧ Band pass filtering
⑨ ROI Stats
⑩ Switch vertical axes and change font color and size of text
11 Legend (log file) 12 voice commands 13 analyze data without me