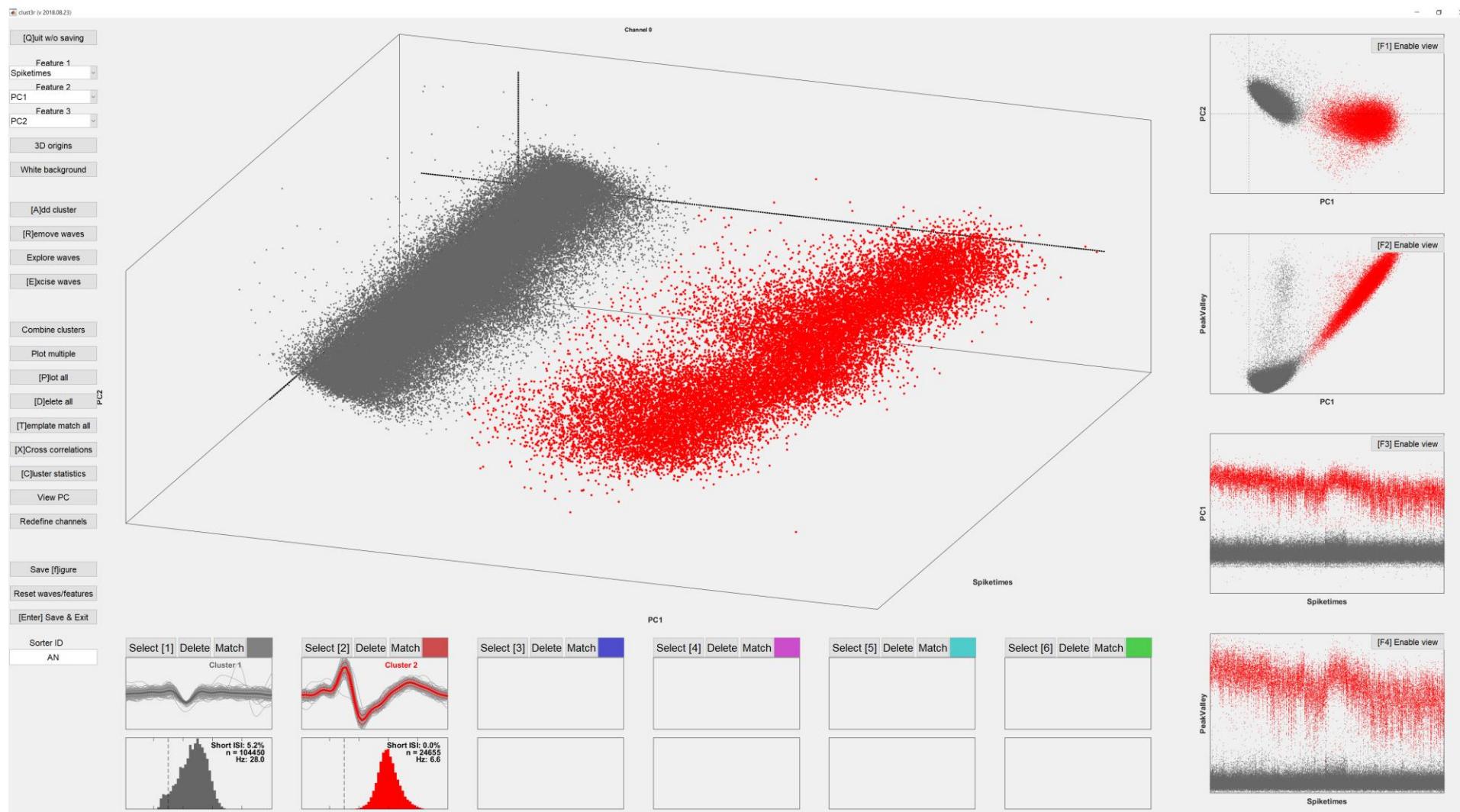


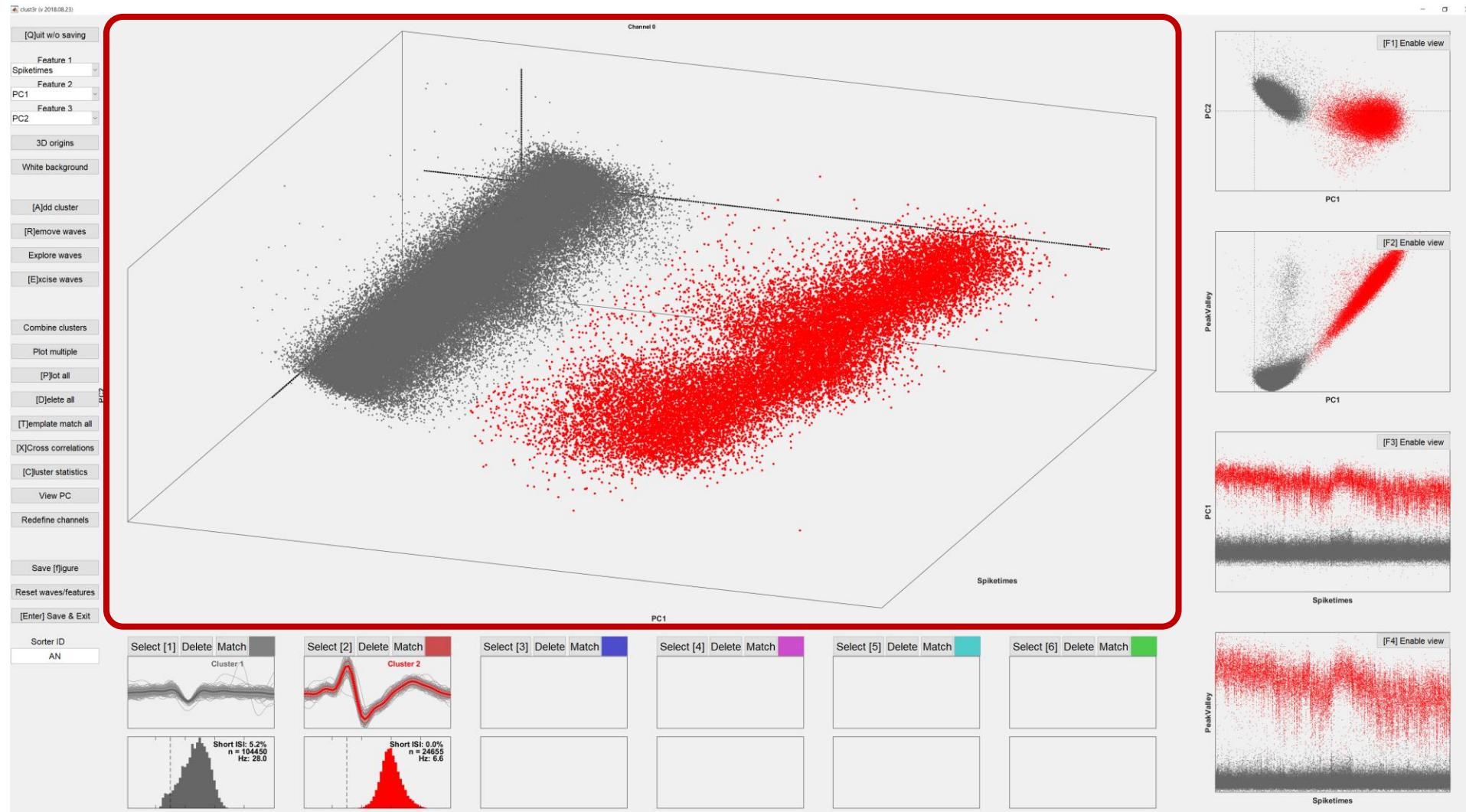
clust3r quick start guide

- The following pages provide brief descriptions of plot windows and action buttons



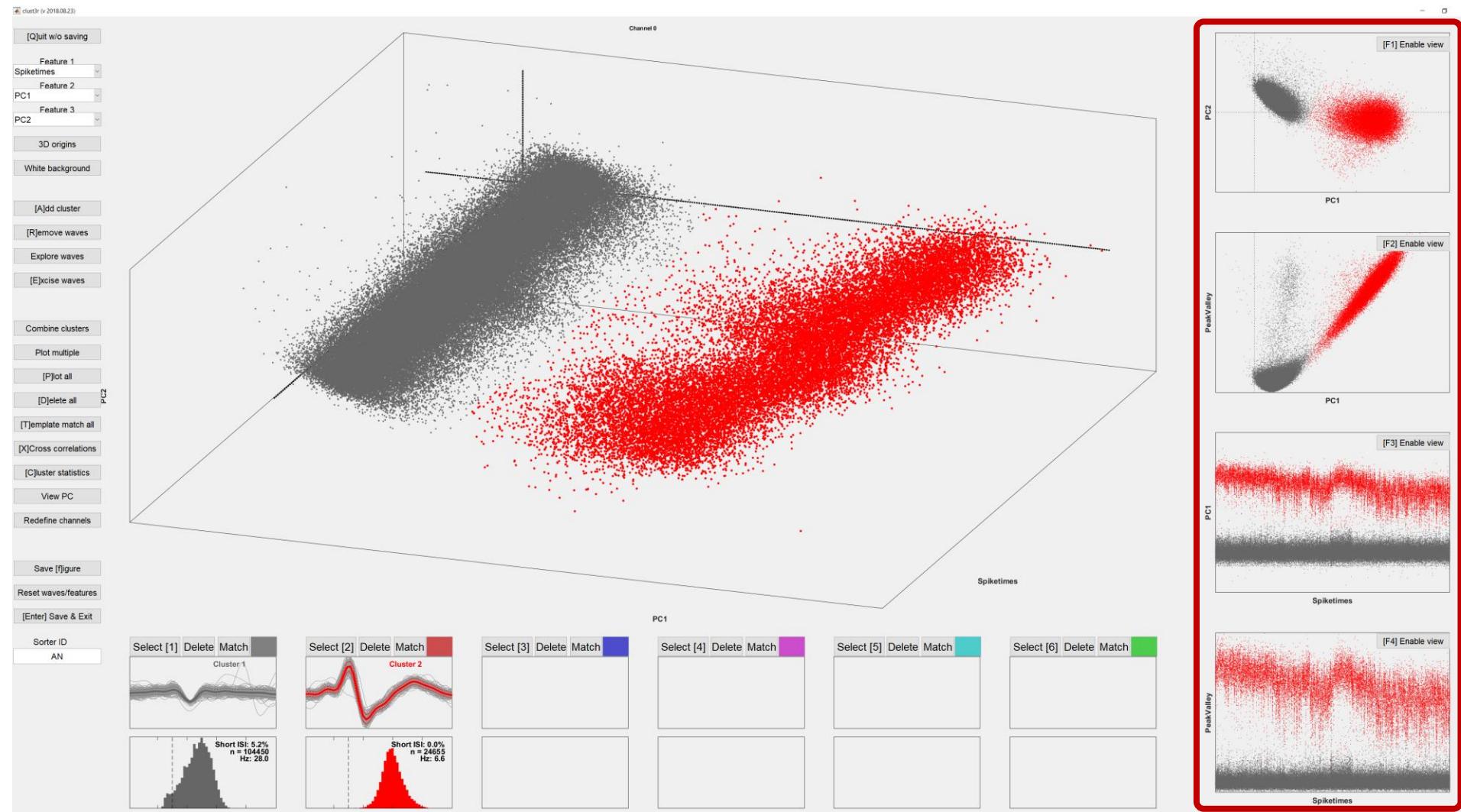
Main 3D sort window

- Plots data points reflecting three waveform features
- Use mouse to manipulate view
- Use buttons to edit clusters (see below)



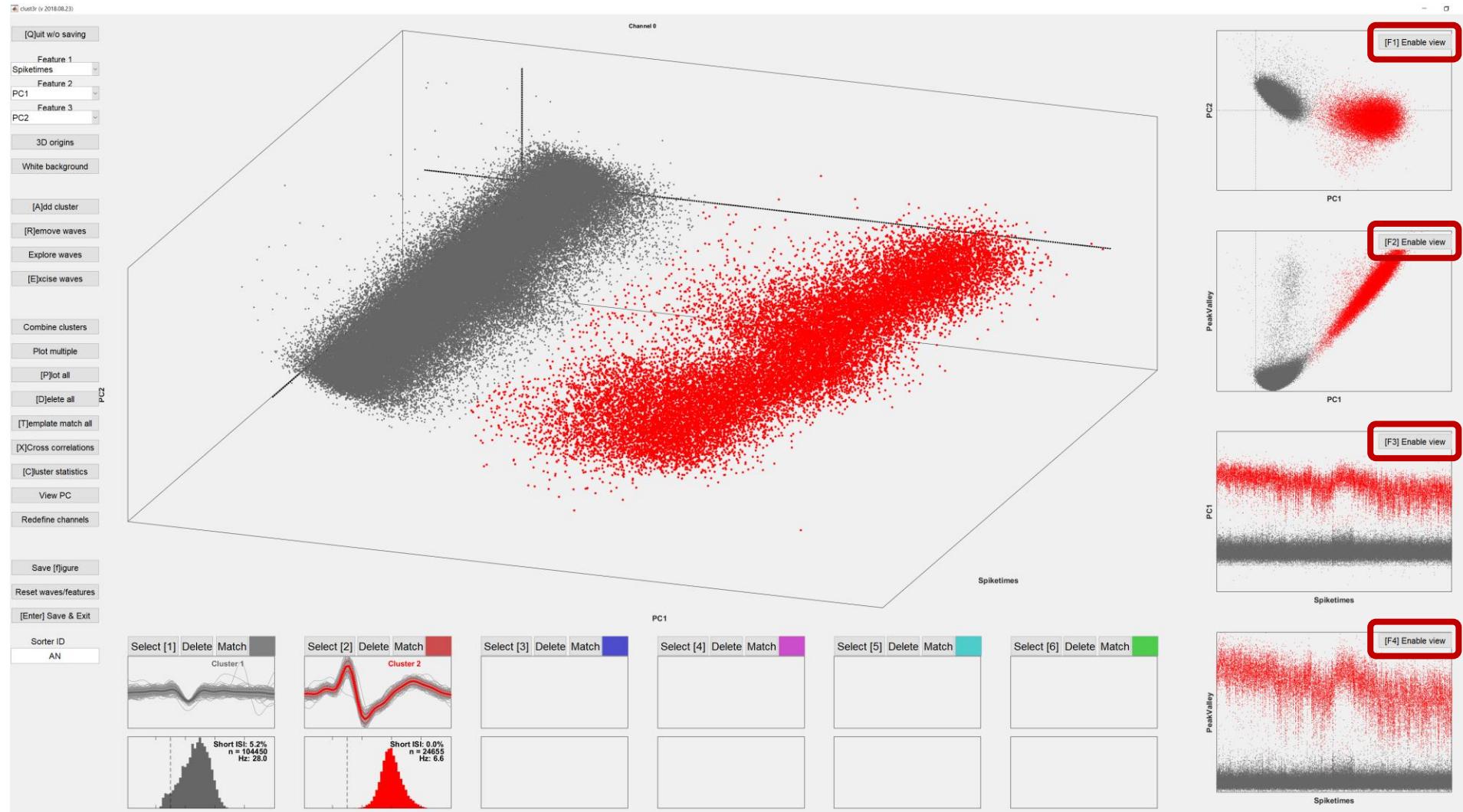
Standard 2D view windows

- Plots data points using four standard feature combinations



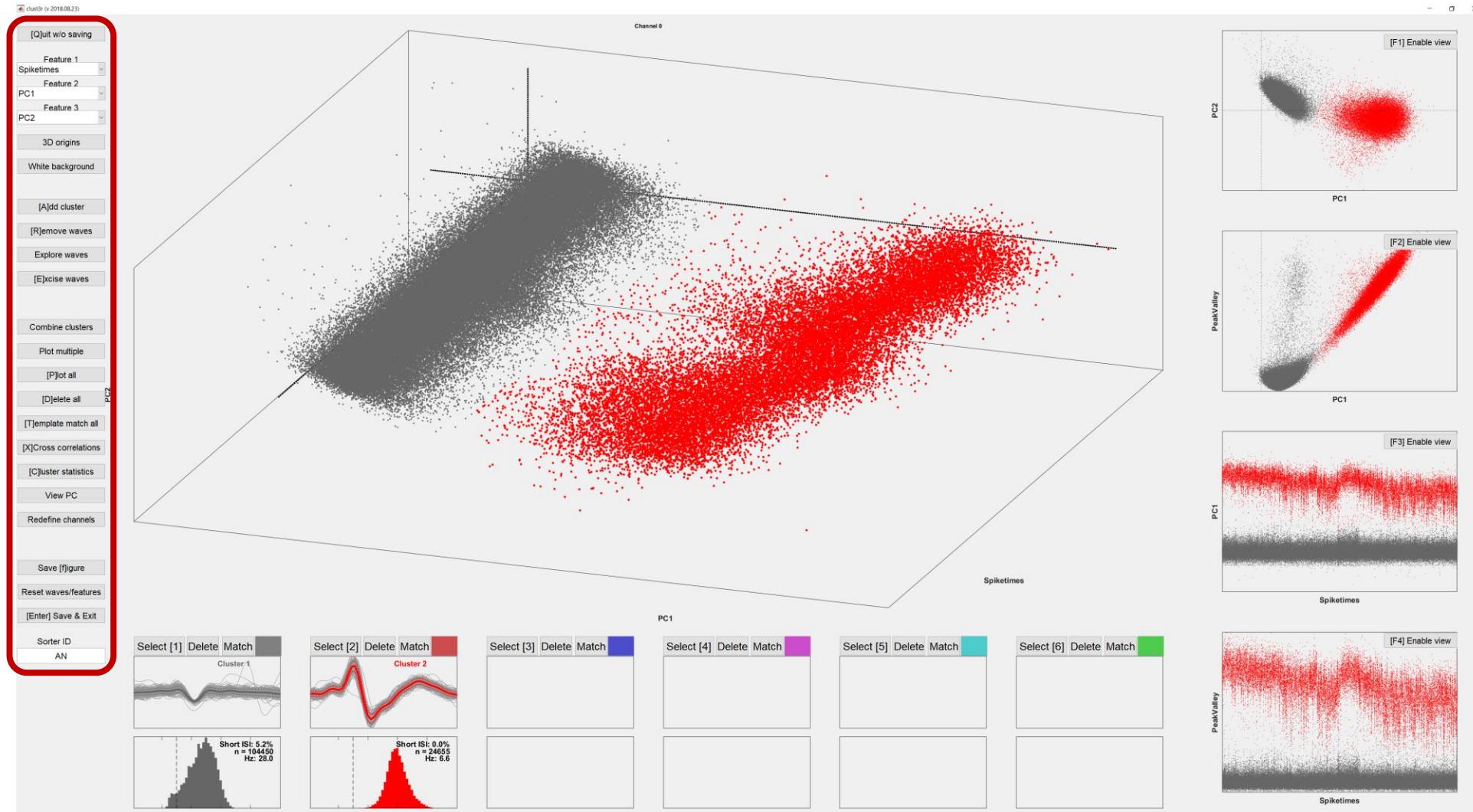
2D view buttons

- Each button enables corresponding view in main 3D sort window



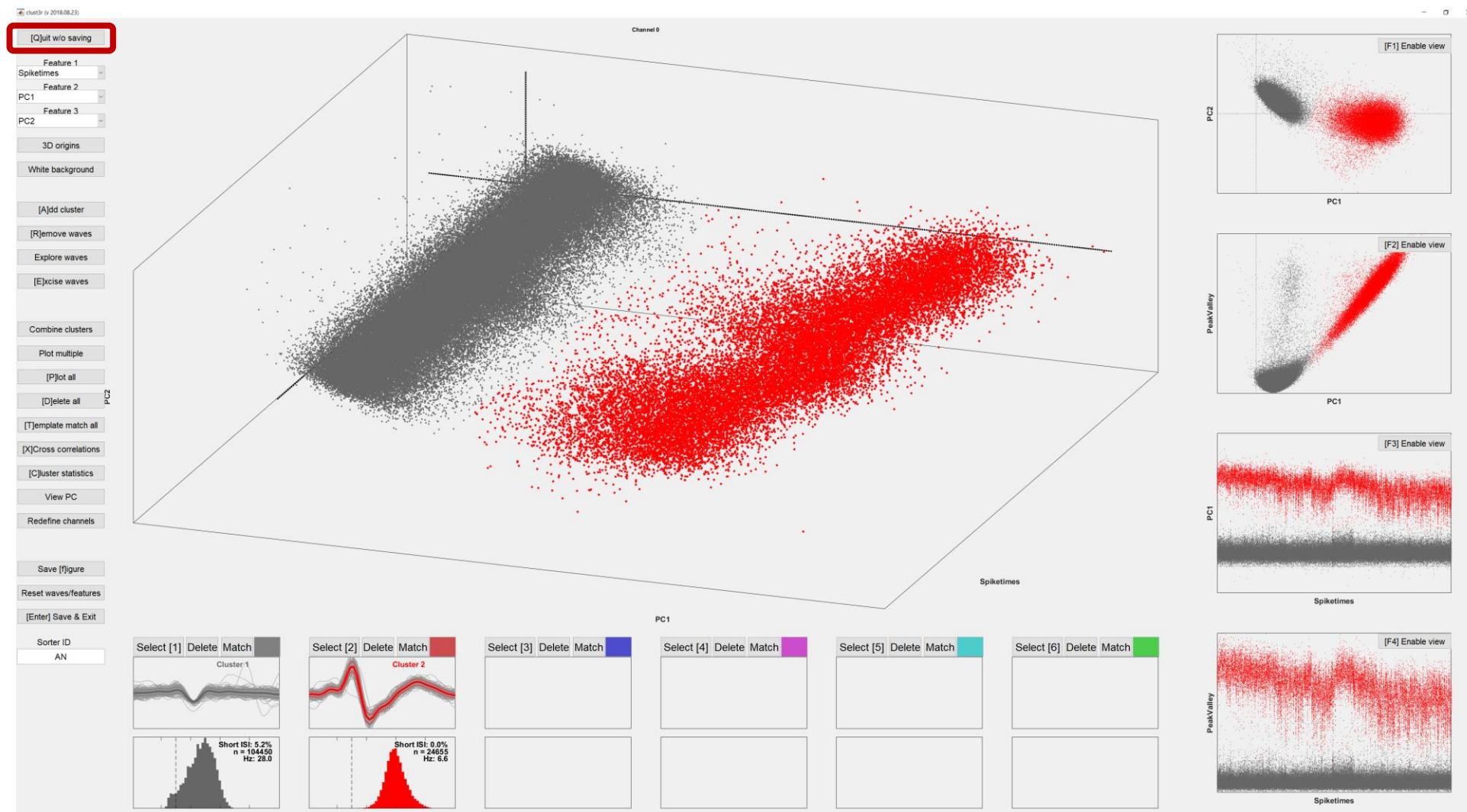
Action buttons

- Brief descriptions of each button from top to bottom are provided on the following pages
- Hotkeys indicated by []



Quit w/o saving

- Exits program without storing current cluster space or writing data files
- Output variables are empty

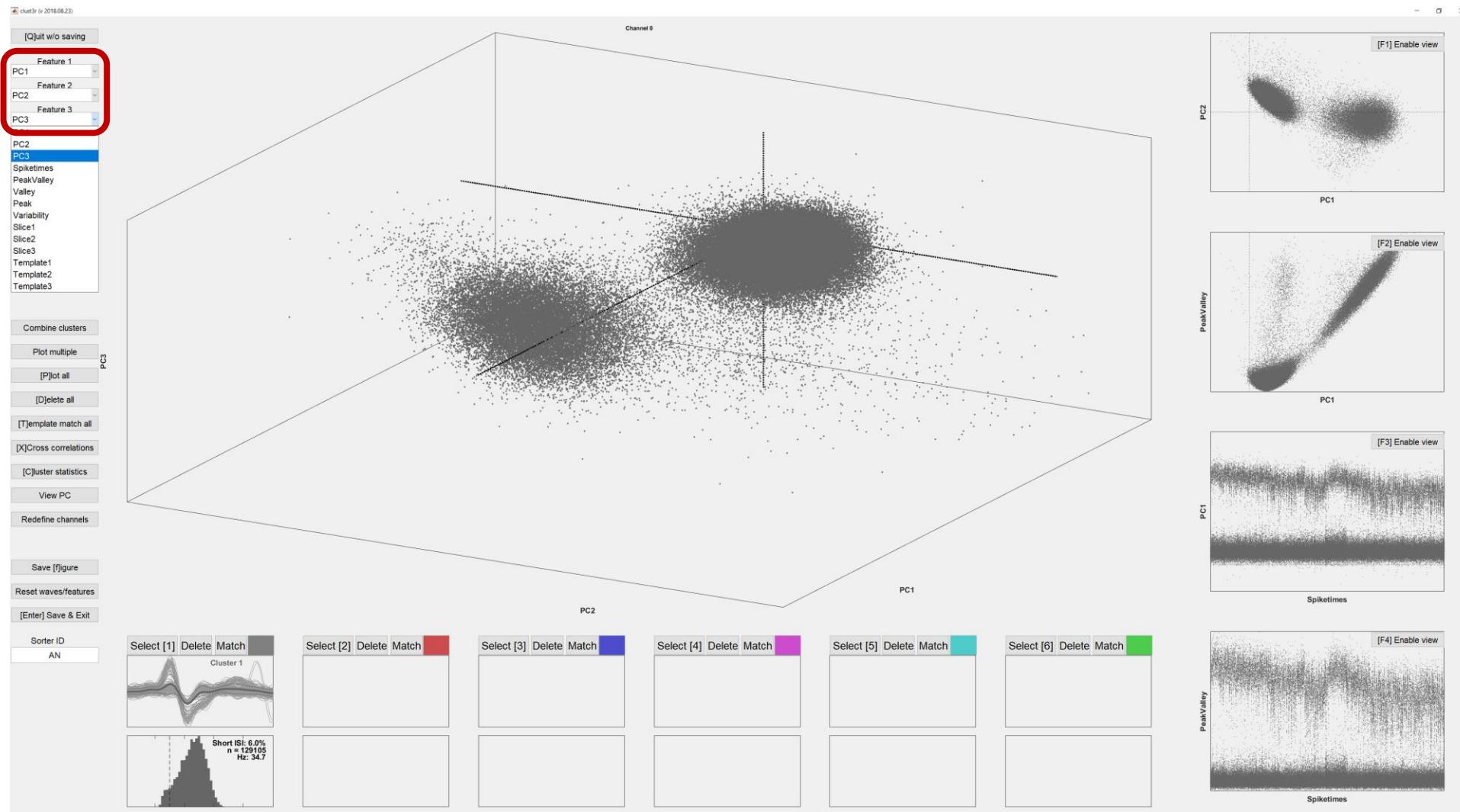


Feature 1, 2, 3

- Drop-down menus allowing user to redefine 3D sorting feature space by setting features plotted on x, y, and z axes

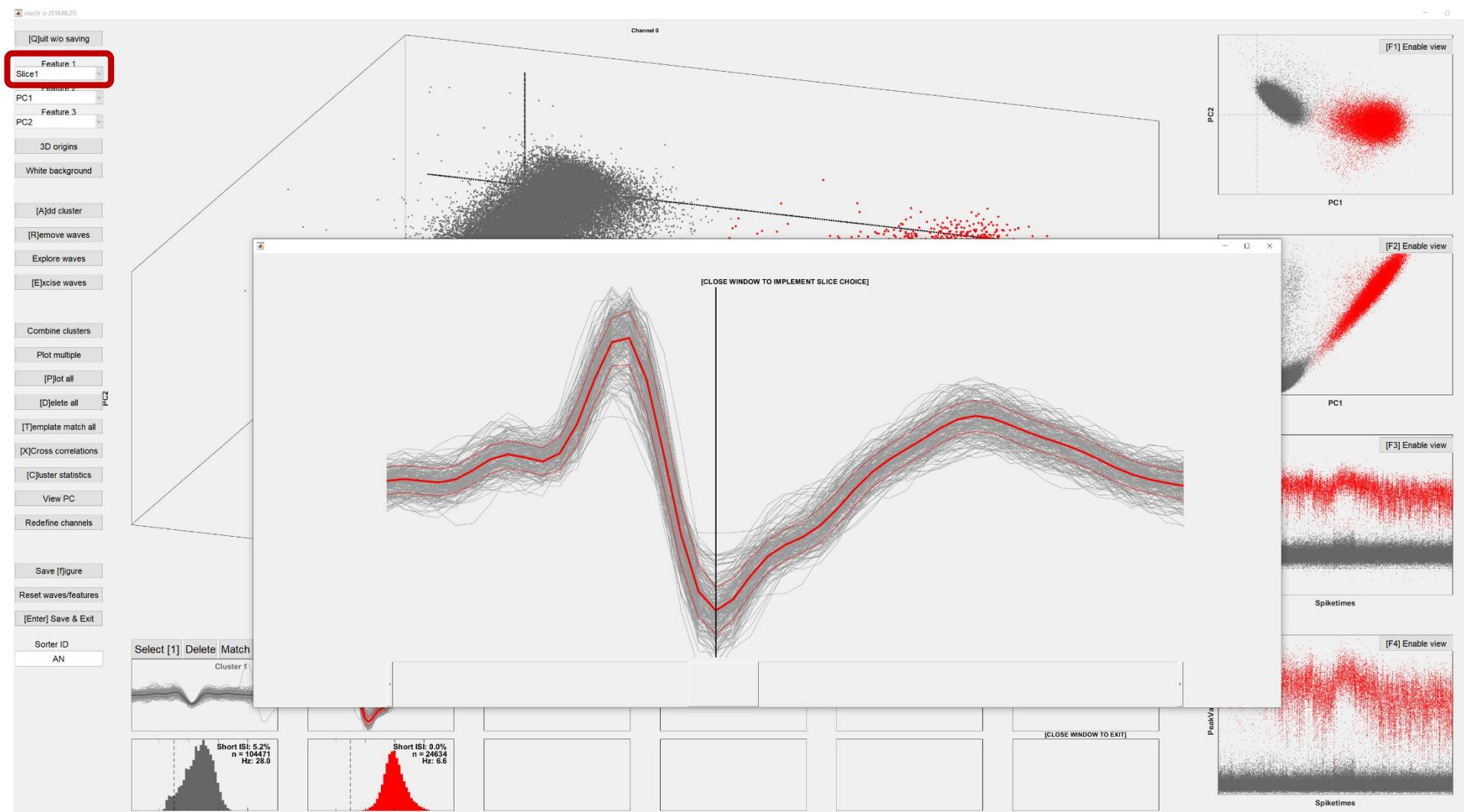
Available features:

- Spiketimes are the timestamps of spike events (input variable)
- PC1-3 are first three principal components
- Peak, Valley refer to waveform max and min
- Variability reflects how smoothly waveform sample points transition from one to the next
- Slice1-3 are specific waveform sample points indicated by user (see next page)
- Template1-3 quantifies Euclidean distance from mean waveform of one of the user-defined clusters



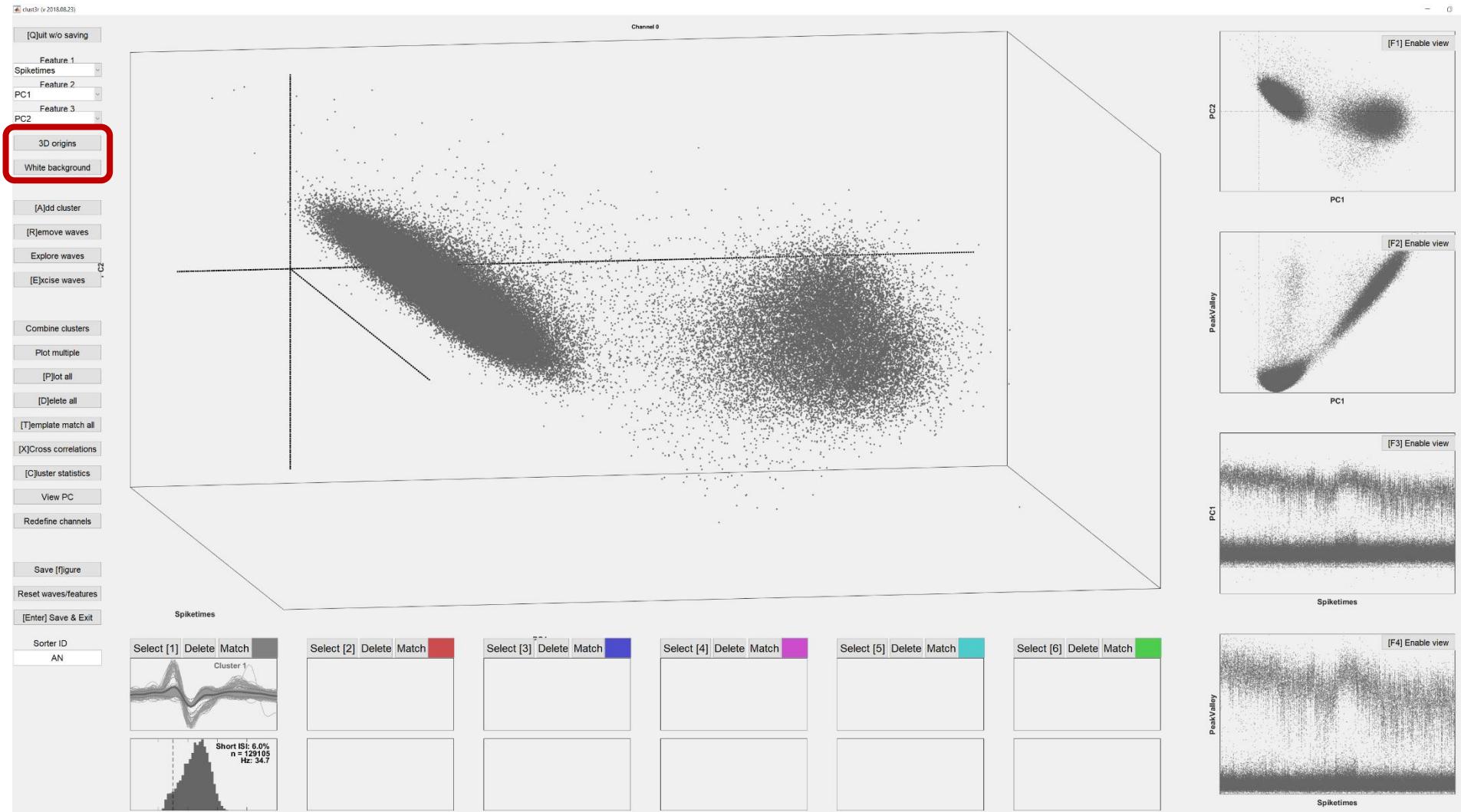
Feature 1, 2, 3: Slice1-3

- After selecting a Slice option, drag the vertical black line to the desired sample point and close the window



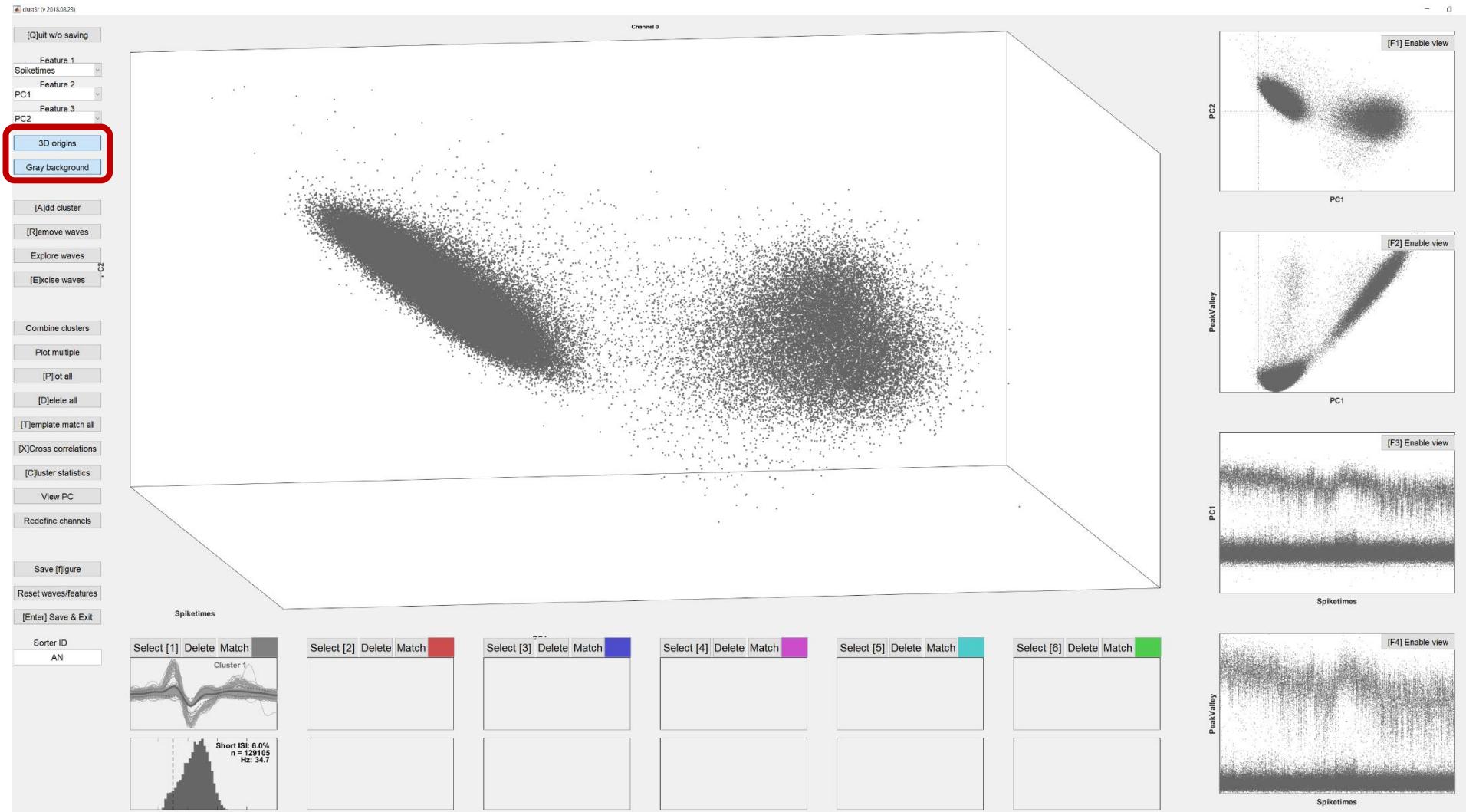
3D origins & White background

- Toggle origin lines and background color of cluster plots



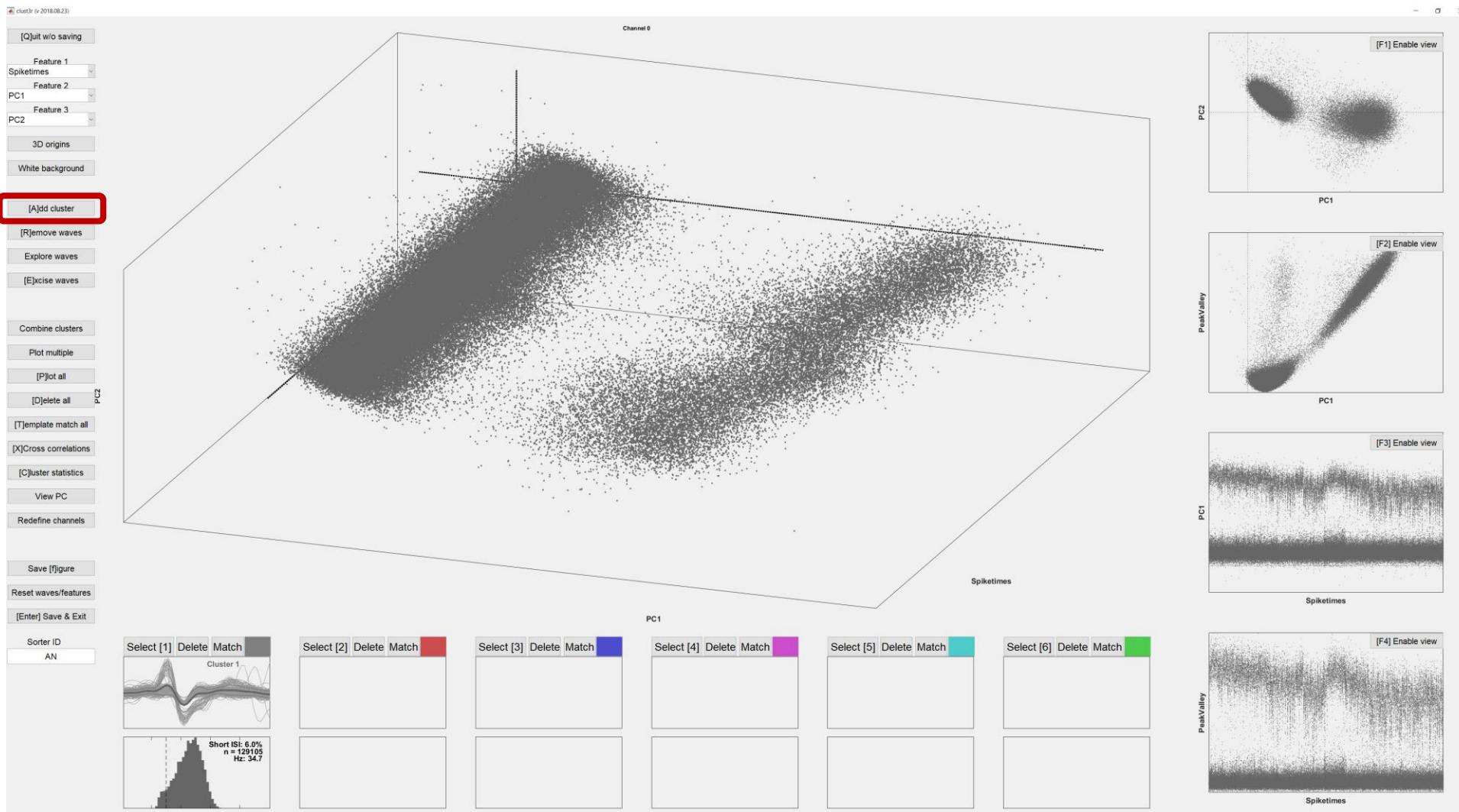
3D origins & White background

- Toggle origin lines and background color of cluster plots



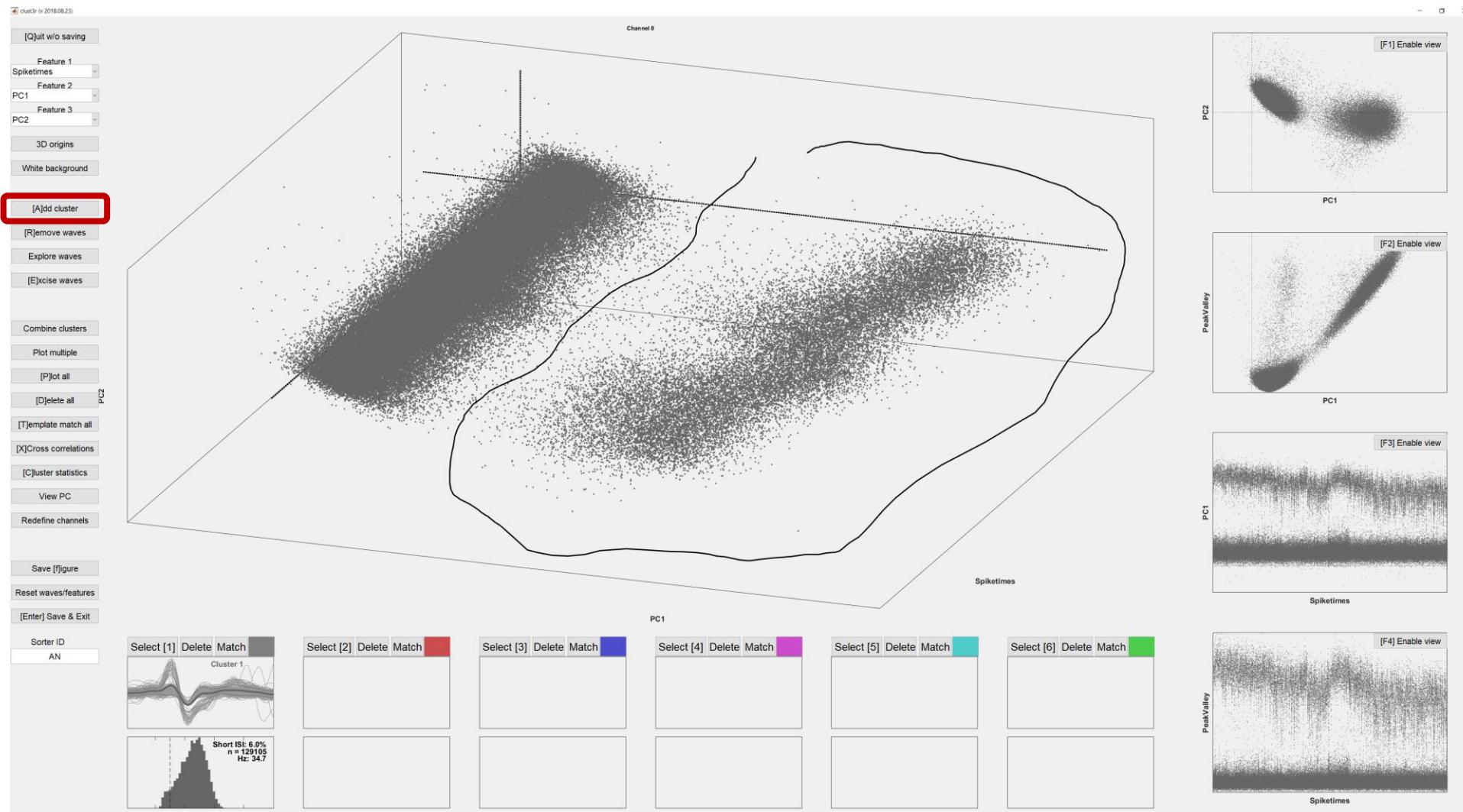
Add cluster

- Add new cluster defined by user drawn contour



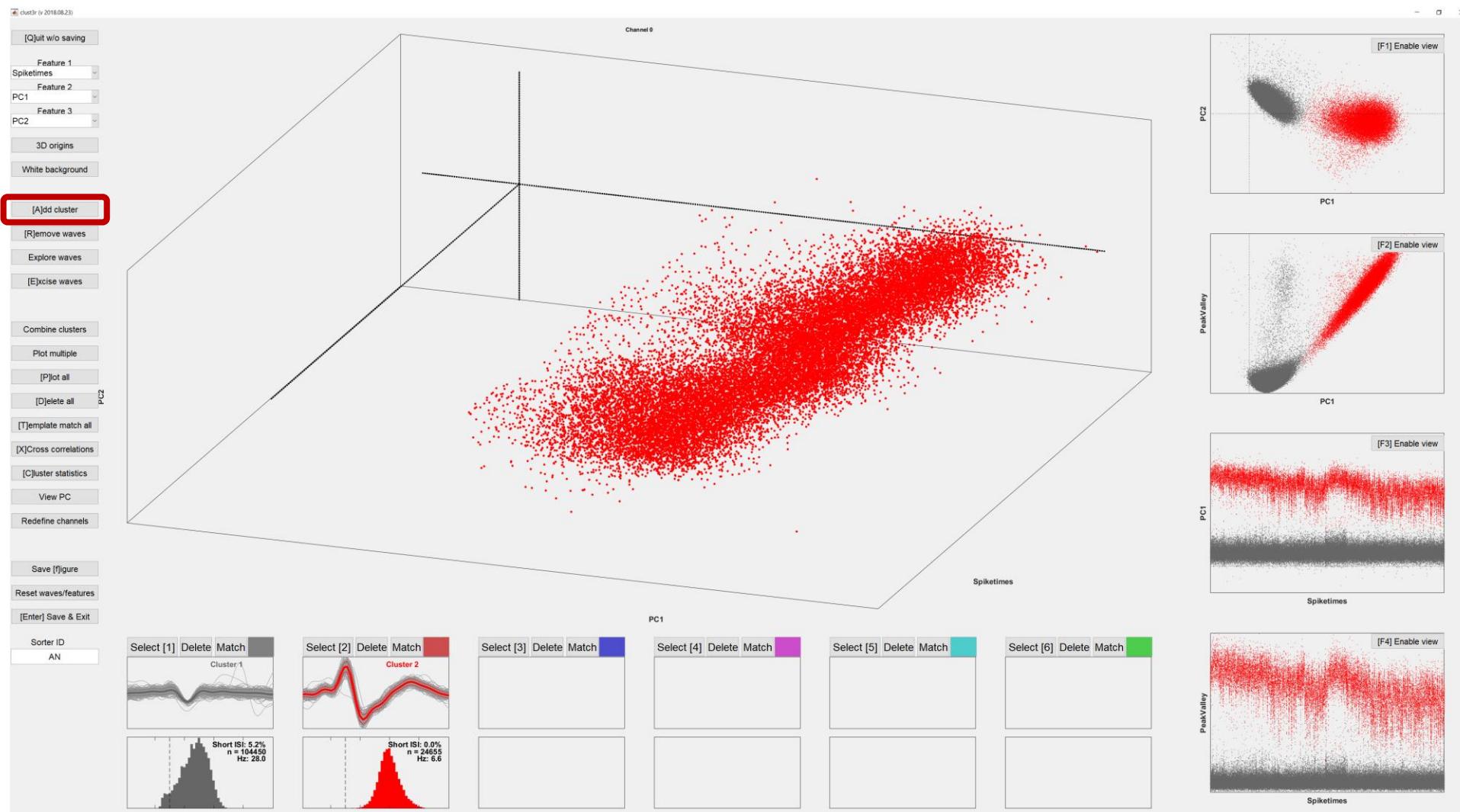
Add cluster

- Clicking or pressing hotkey toggles contour drawing mode for the mouse cursor
- Anything inside contour is added to new cluster



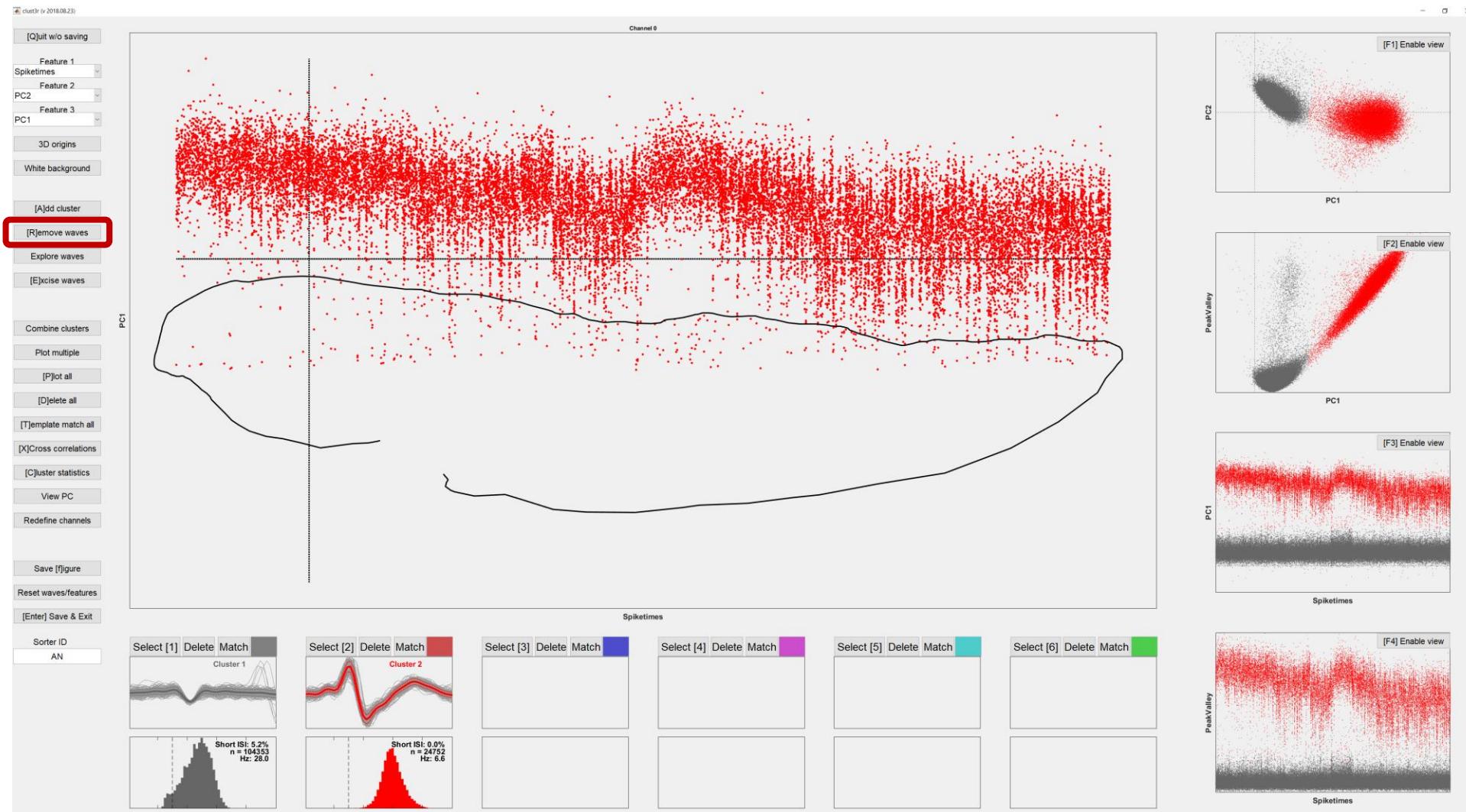
Add cluster

- Upon releasing mouse button, new cluster is plotted



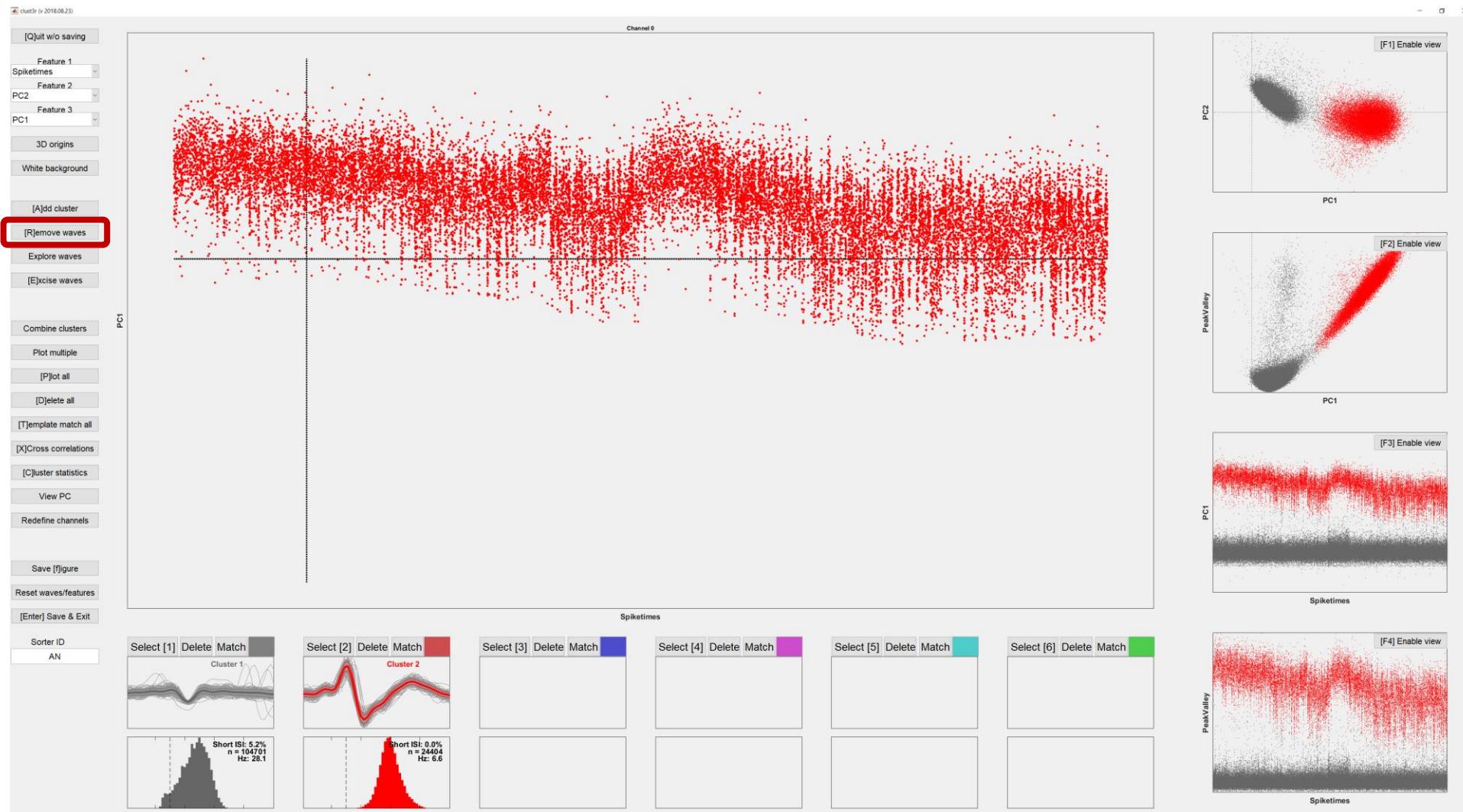
Remove waves

- Similar to 'Add cluster', Remove waves allows user to remove points inside contour from a cluster



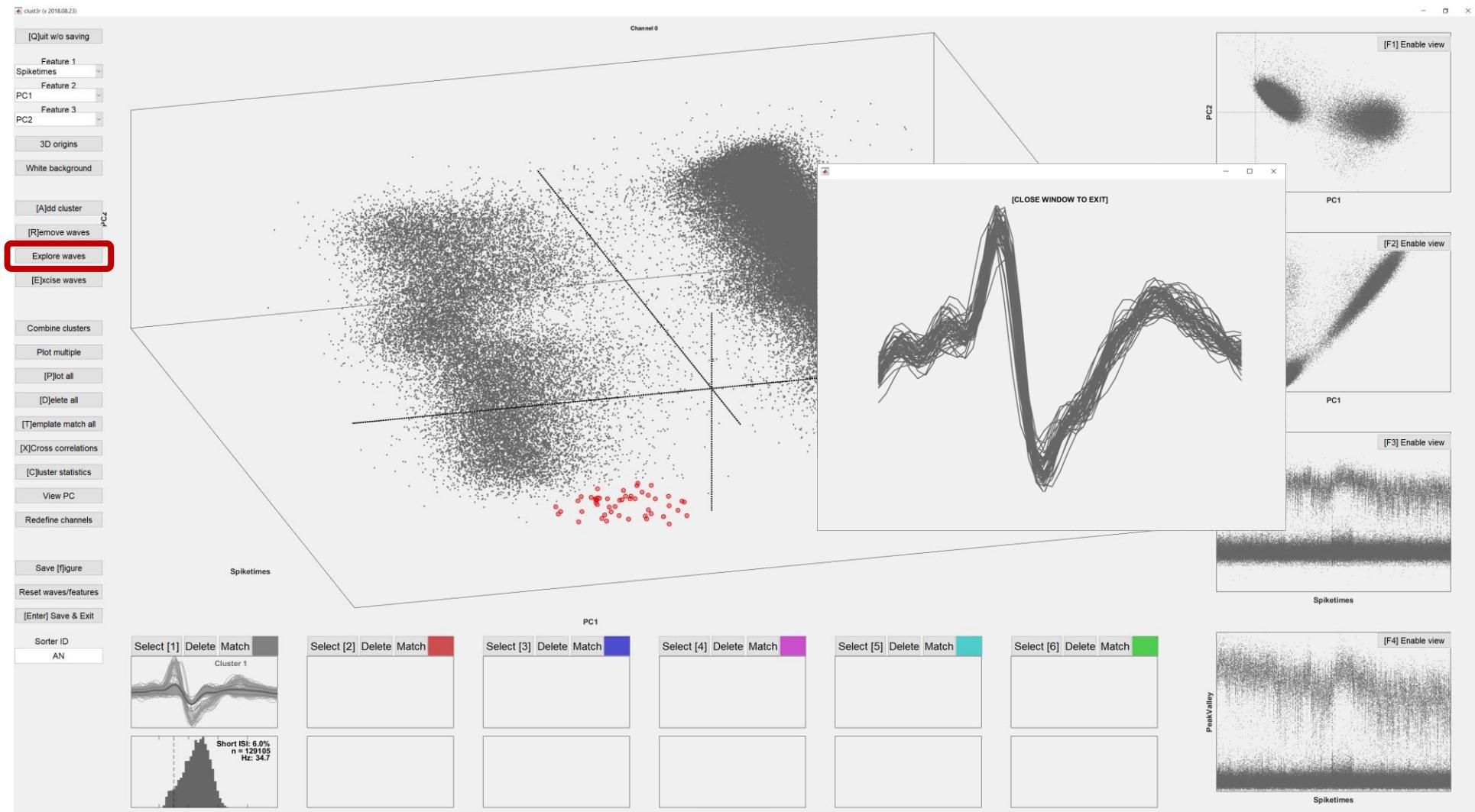
Remove waves

- Upon releasing mouse, any points inside contour are removed from cluster and added to Cluster 1, which is the default unsorted cluster bin



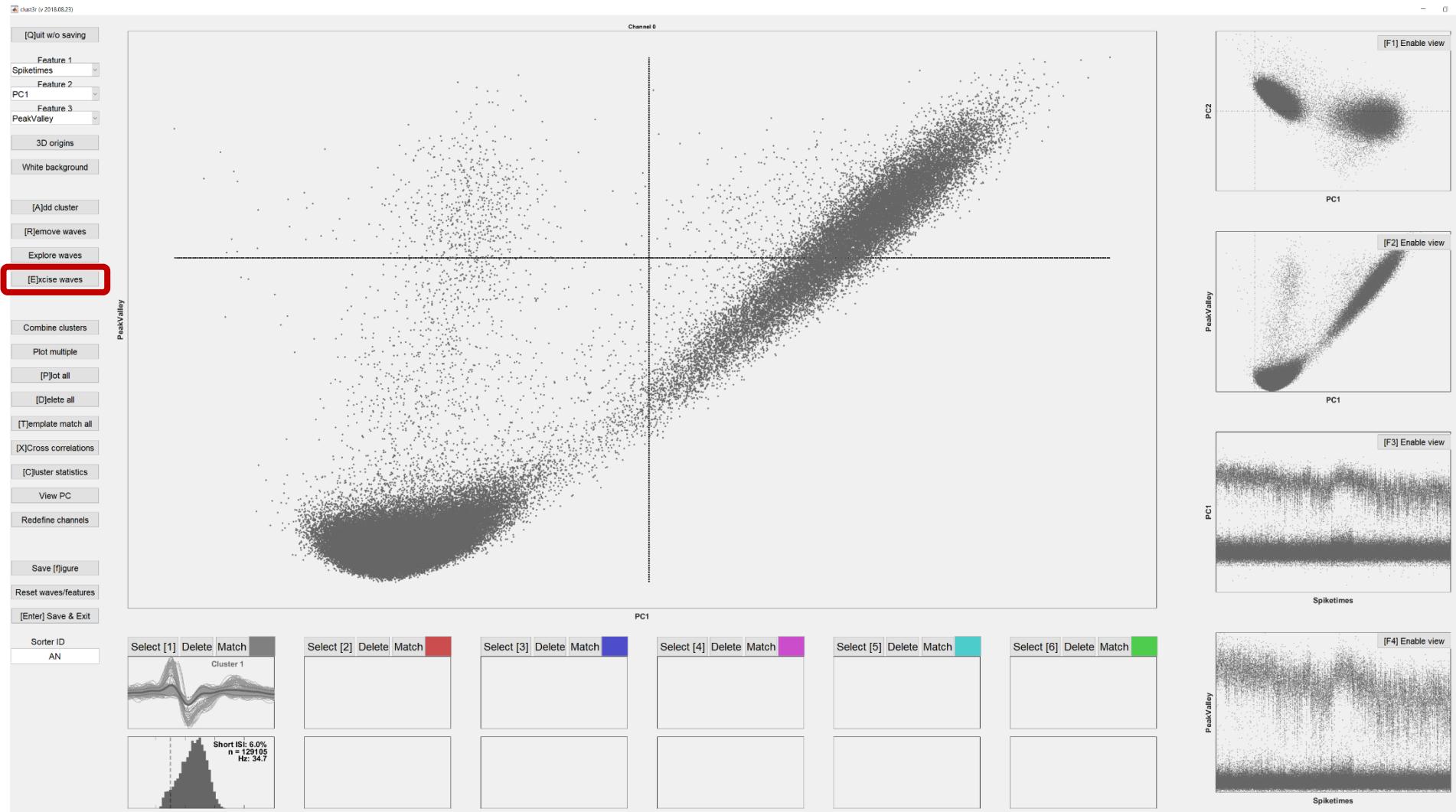
Explore waves

- Plots new window showing sample waveforms of datapoints near click point in 3D sort window, which are highlighted in red
- Close window to exit



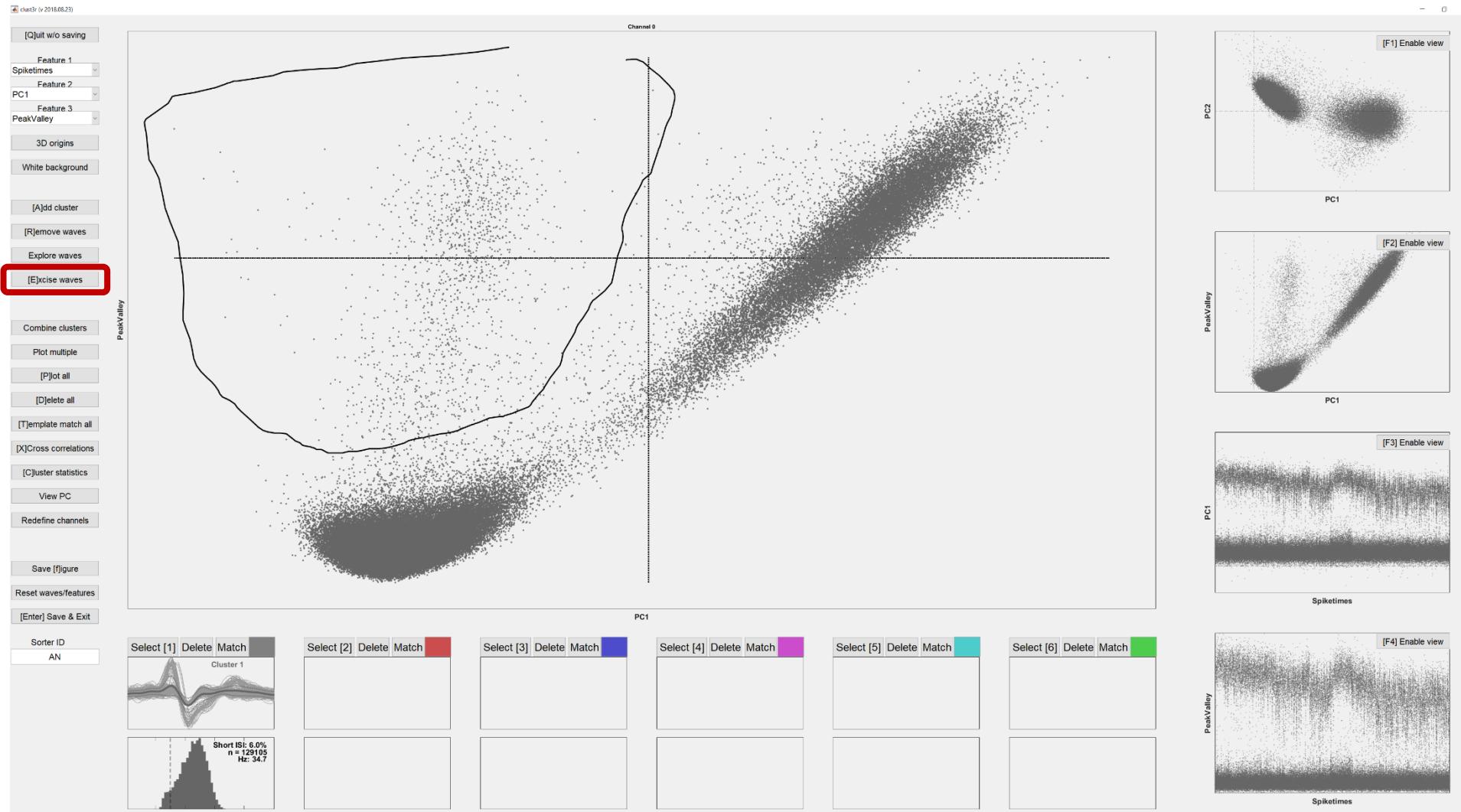
Excise waves

- **Note:** this function only works when no clusters are defined other than default unsorted Cluster 1.
- Similar to 'Add cluster', Excise waves allows user to remove points inside contour from points in current sorting session
- Differs from 'Remove waves' in that waves are removed from Cluster 1 instead of removed from Cluster n and added to Cluster 1



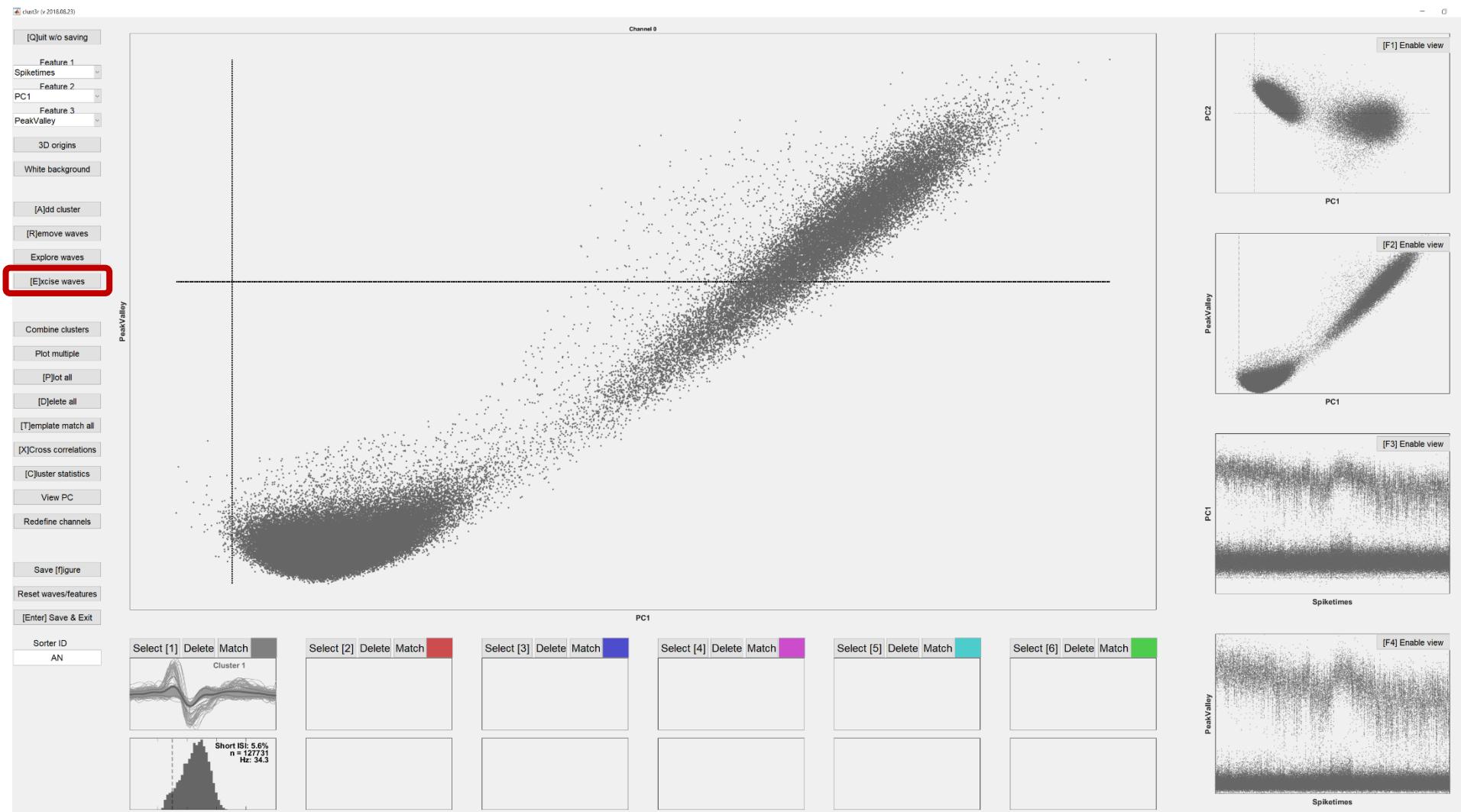
Excise waves

- Excising waves may be desirable in the case of noise waveforms (electrical artifact, etc.)
- E.g., datapoints with large PeakValley values but low PC1 projections typically reflect noisy waveforms



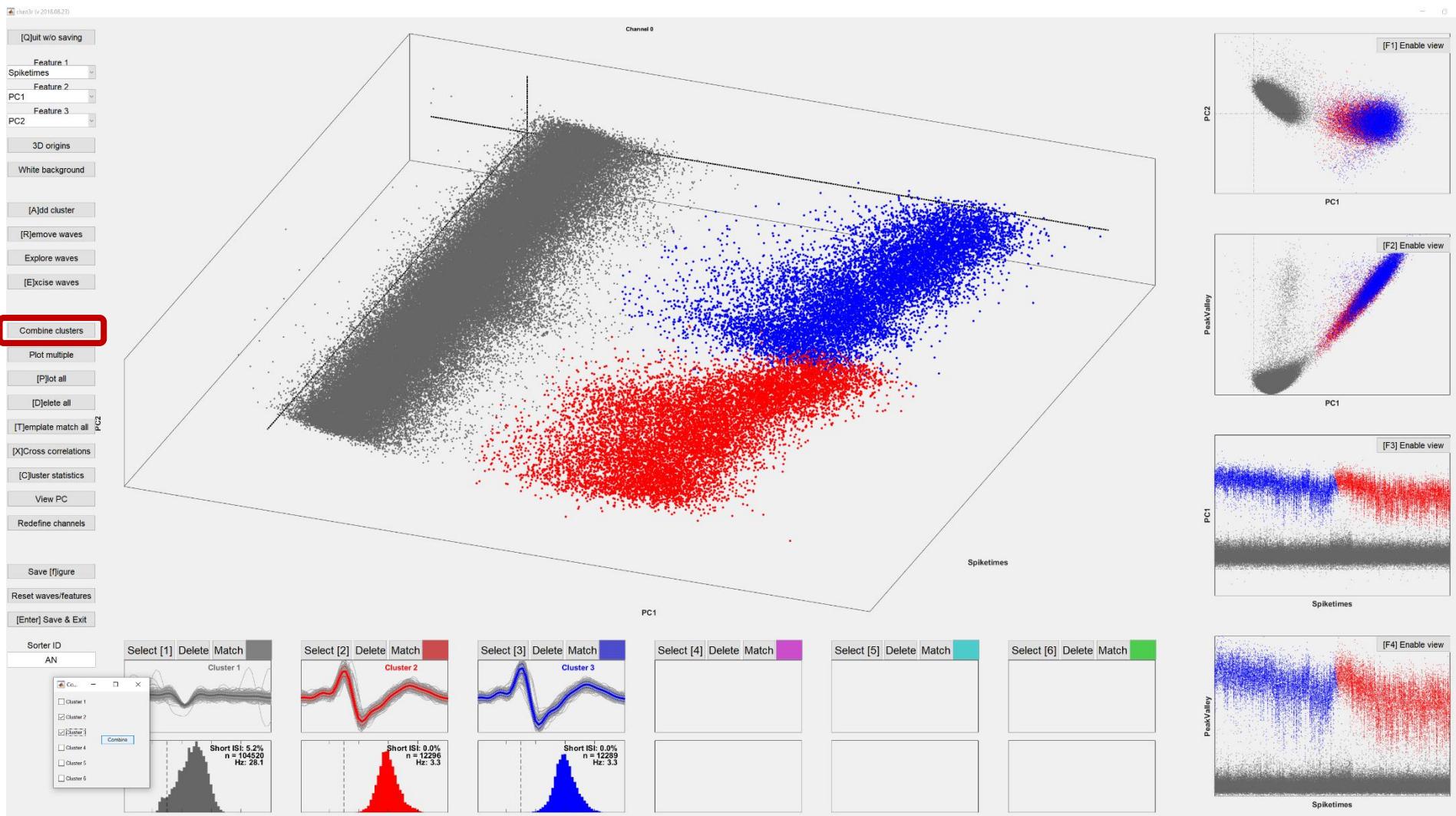
Excise waves

- After waves are removed by Excise, all features (e.g., principal components) are recalculated and plots refreshed in reflection of the newly limited waveform dataset



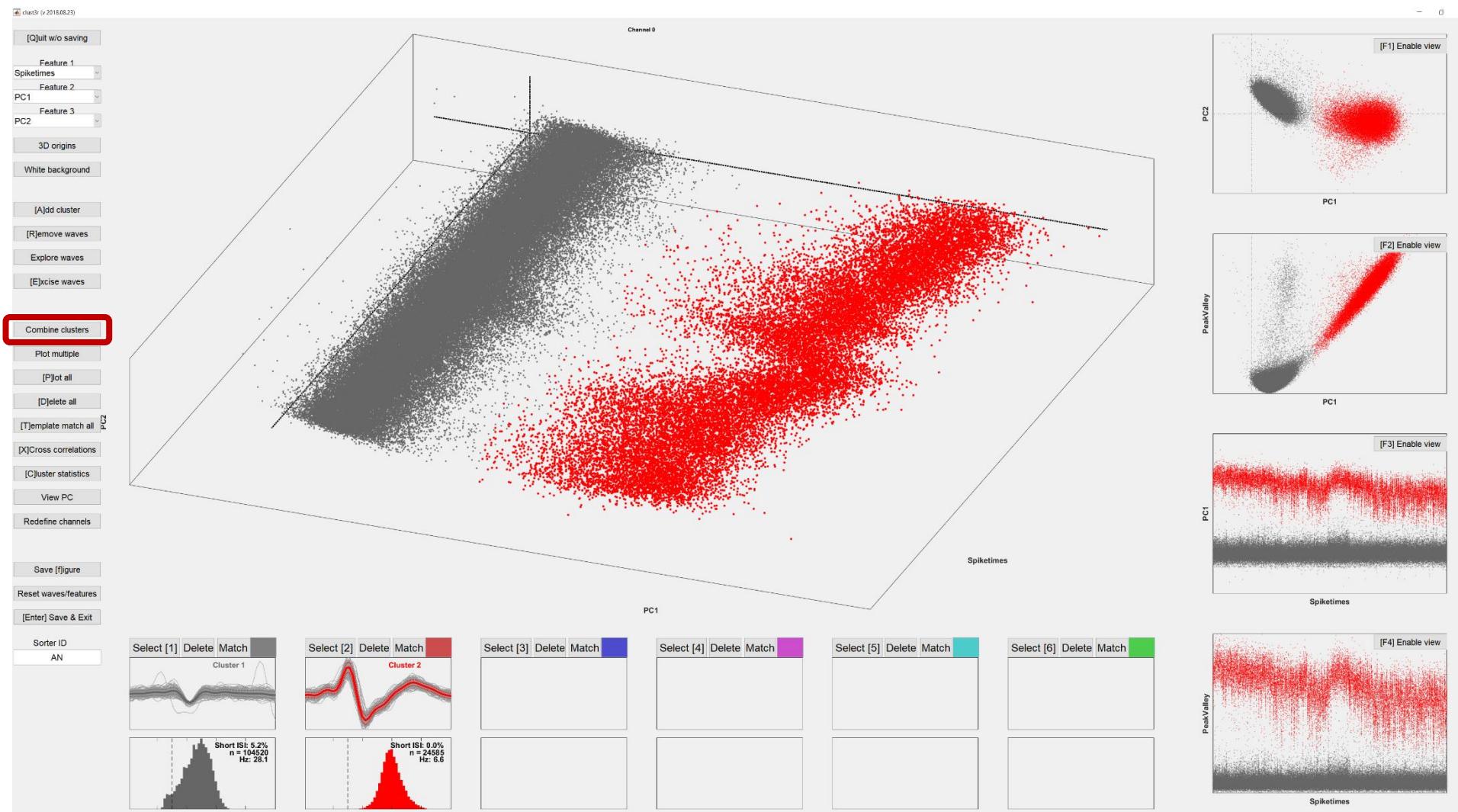
Combine clusters

- Allows user to combine clusters via pop-up checkbox window



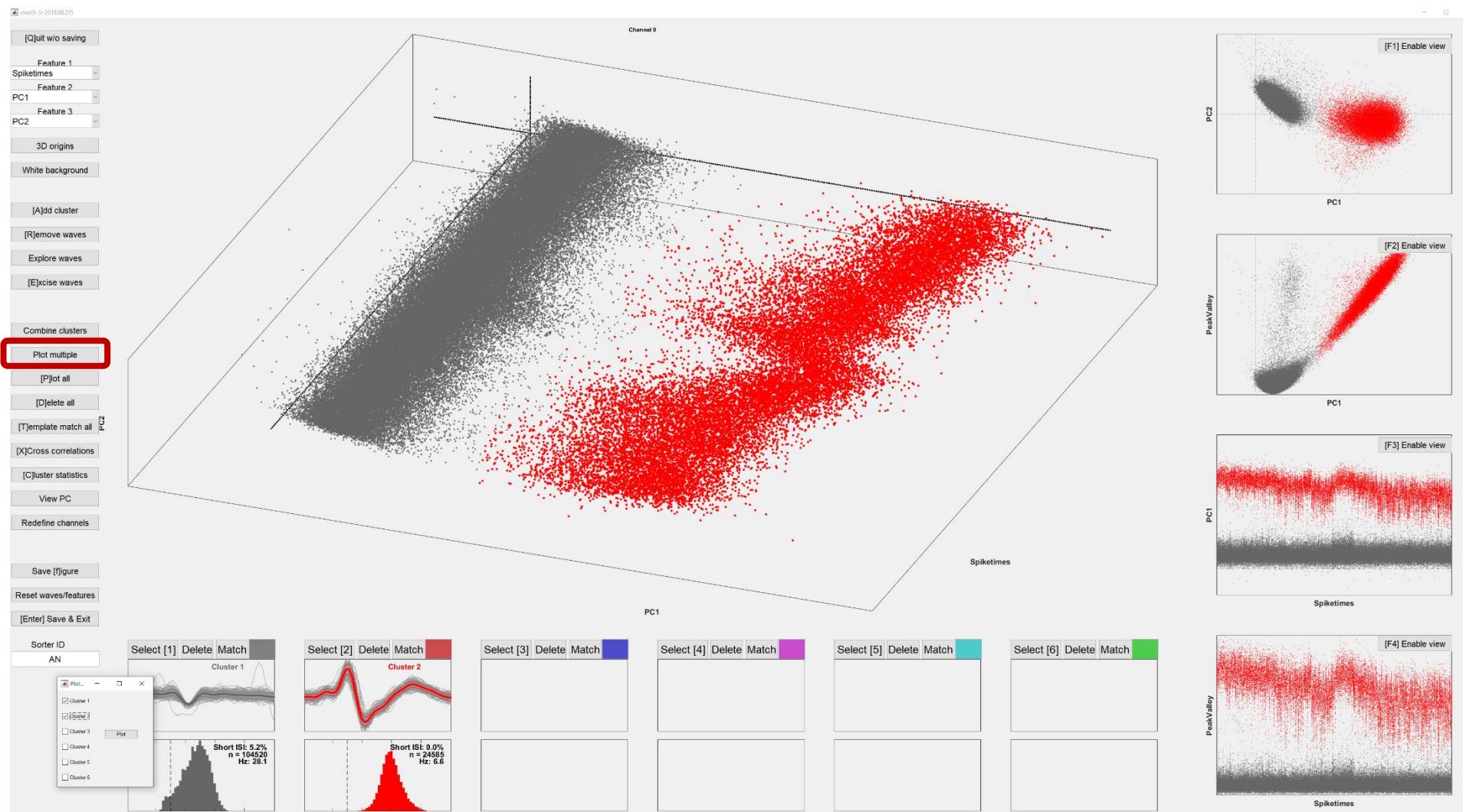
Combine clusters

- Clusters combined after clicking 'Combine' in pop-up window



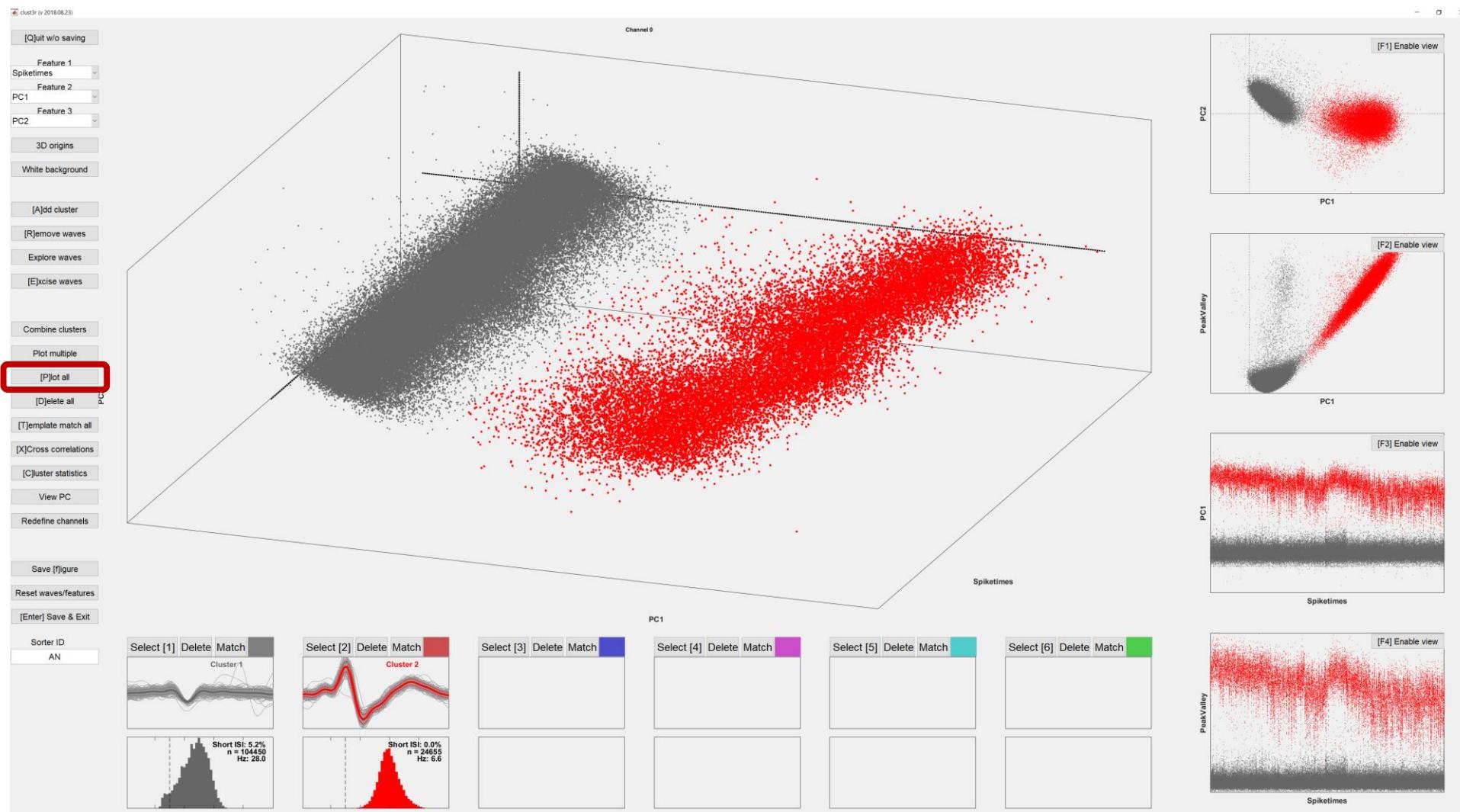
Plot multiple

- Plot any combination of available clusters by clicking checkboxes of pop-up window



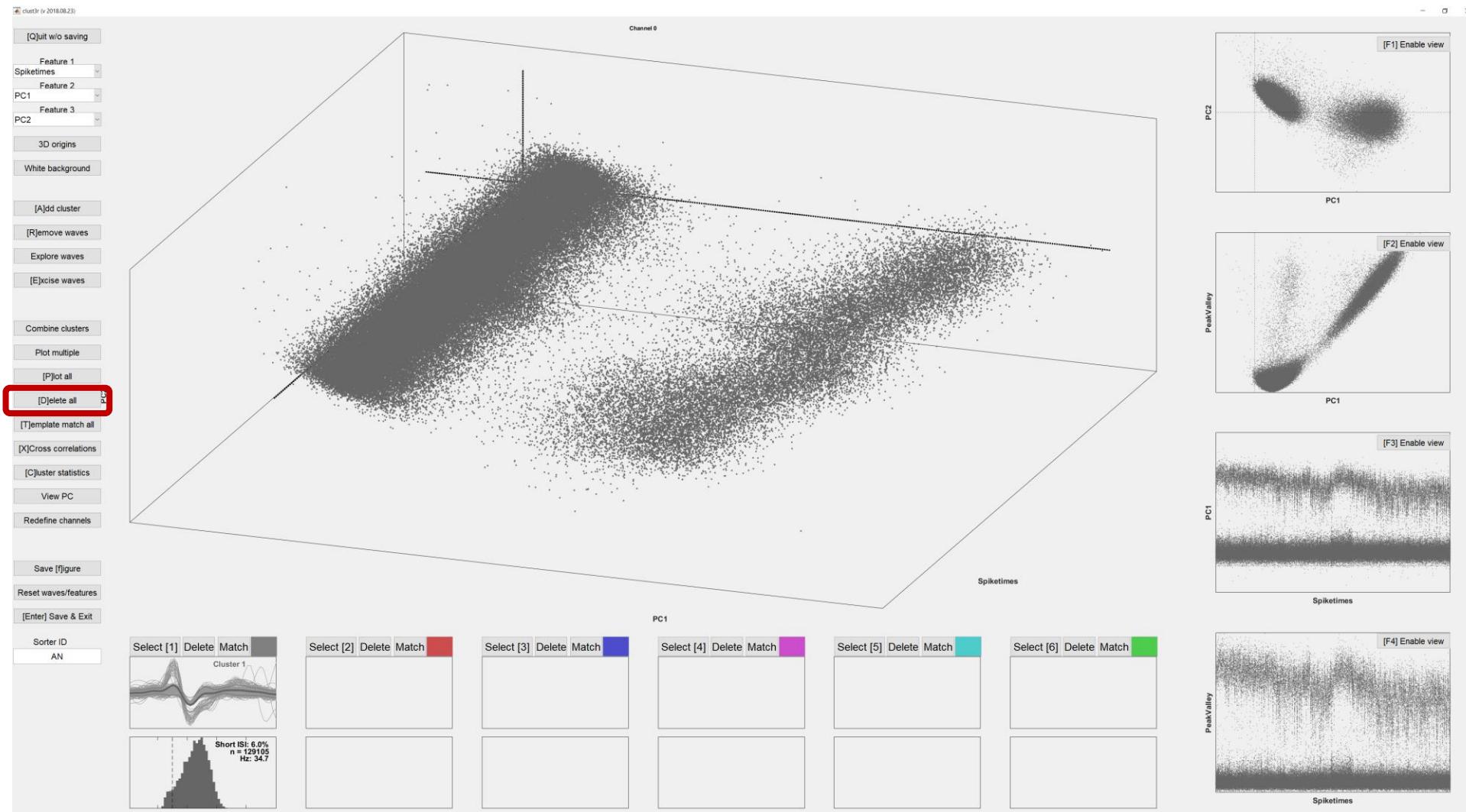
Plot all

- Plot all available clusters



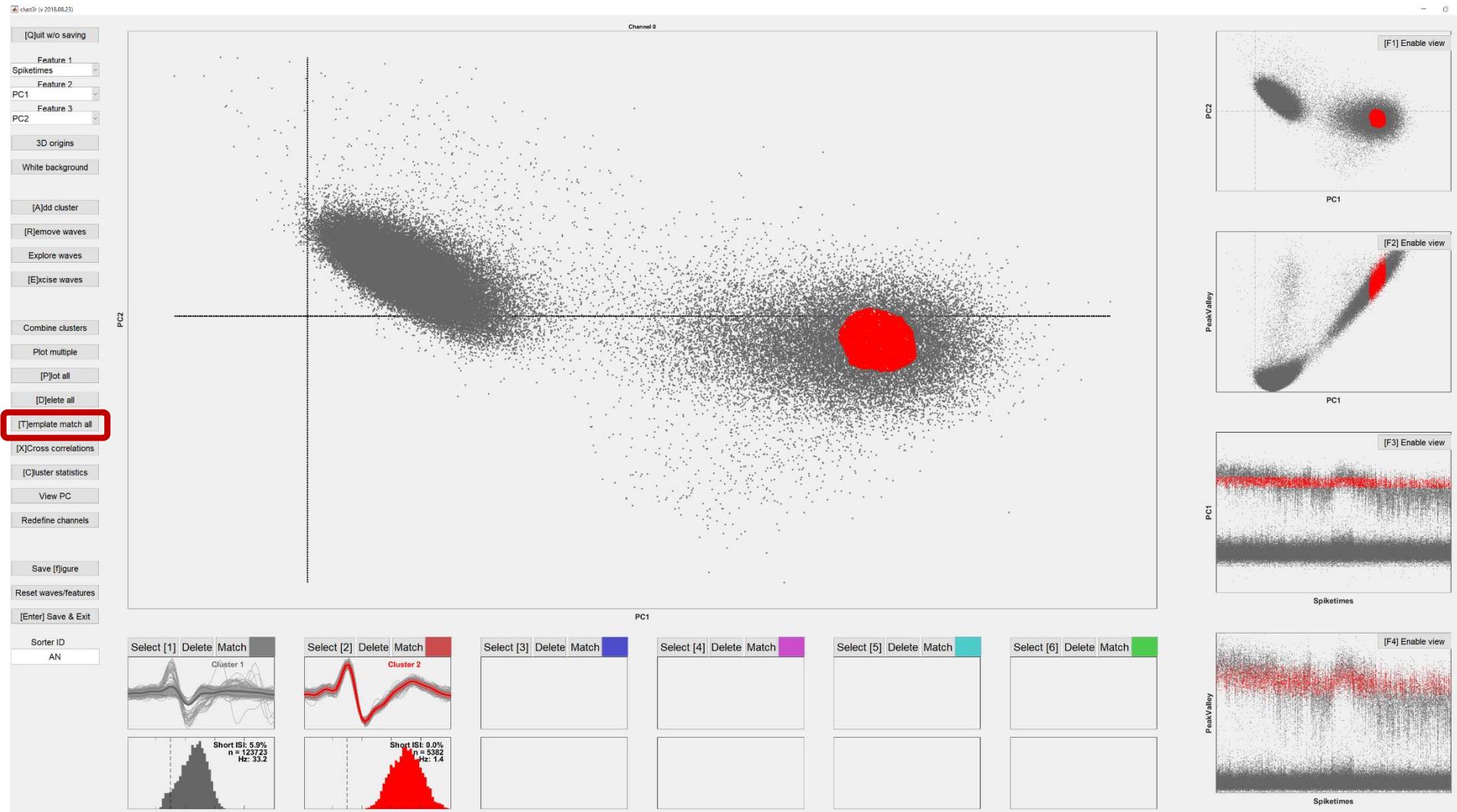
Delete all

- Delete all available clusters, i.e., return all datapoints to default unsorted Cluster 1



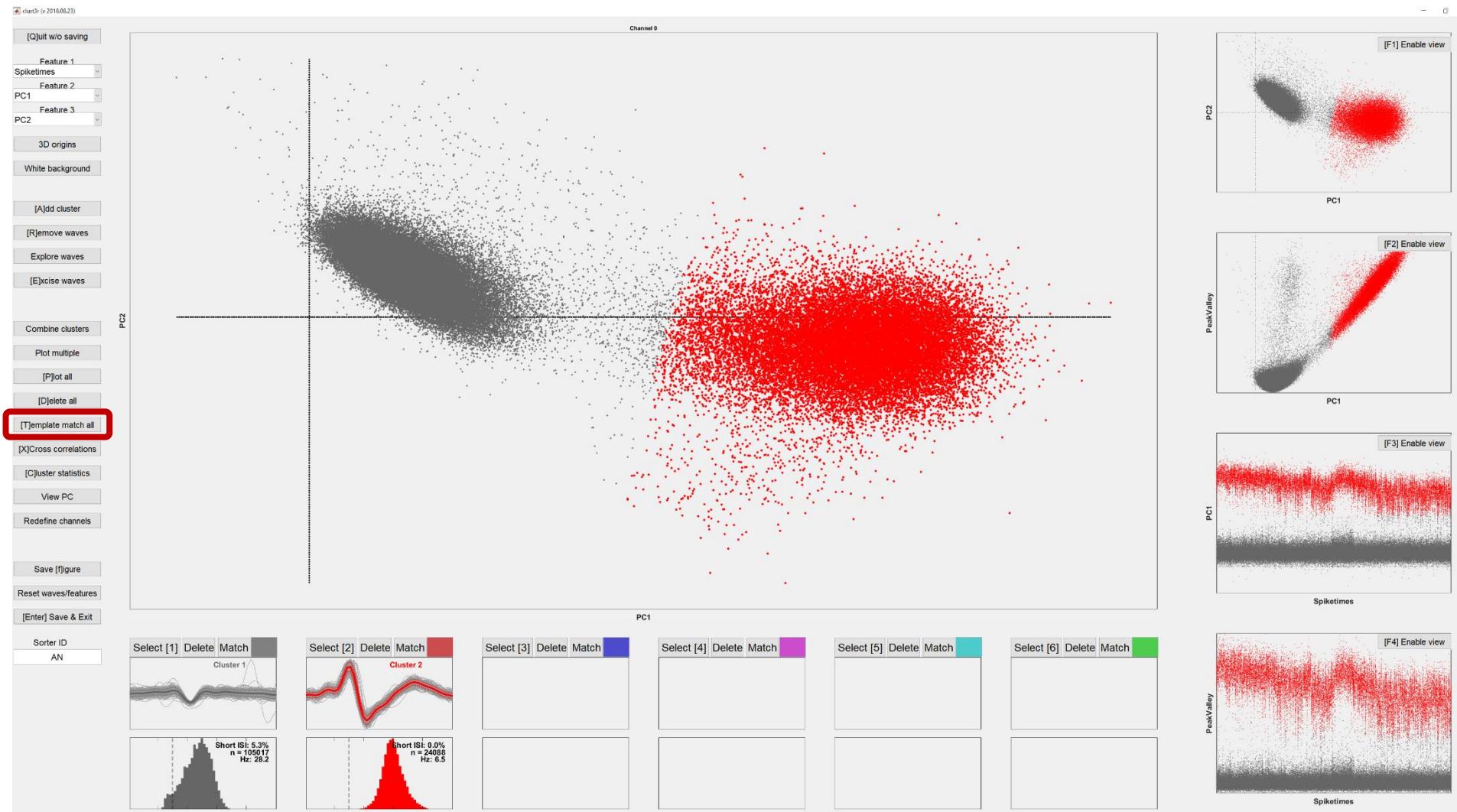
Template match all

- Assign all waveforms to cluster with nearest mean waveform in Euclidean distance space
- E.g., first define central datapoints of desired cluster



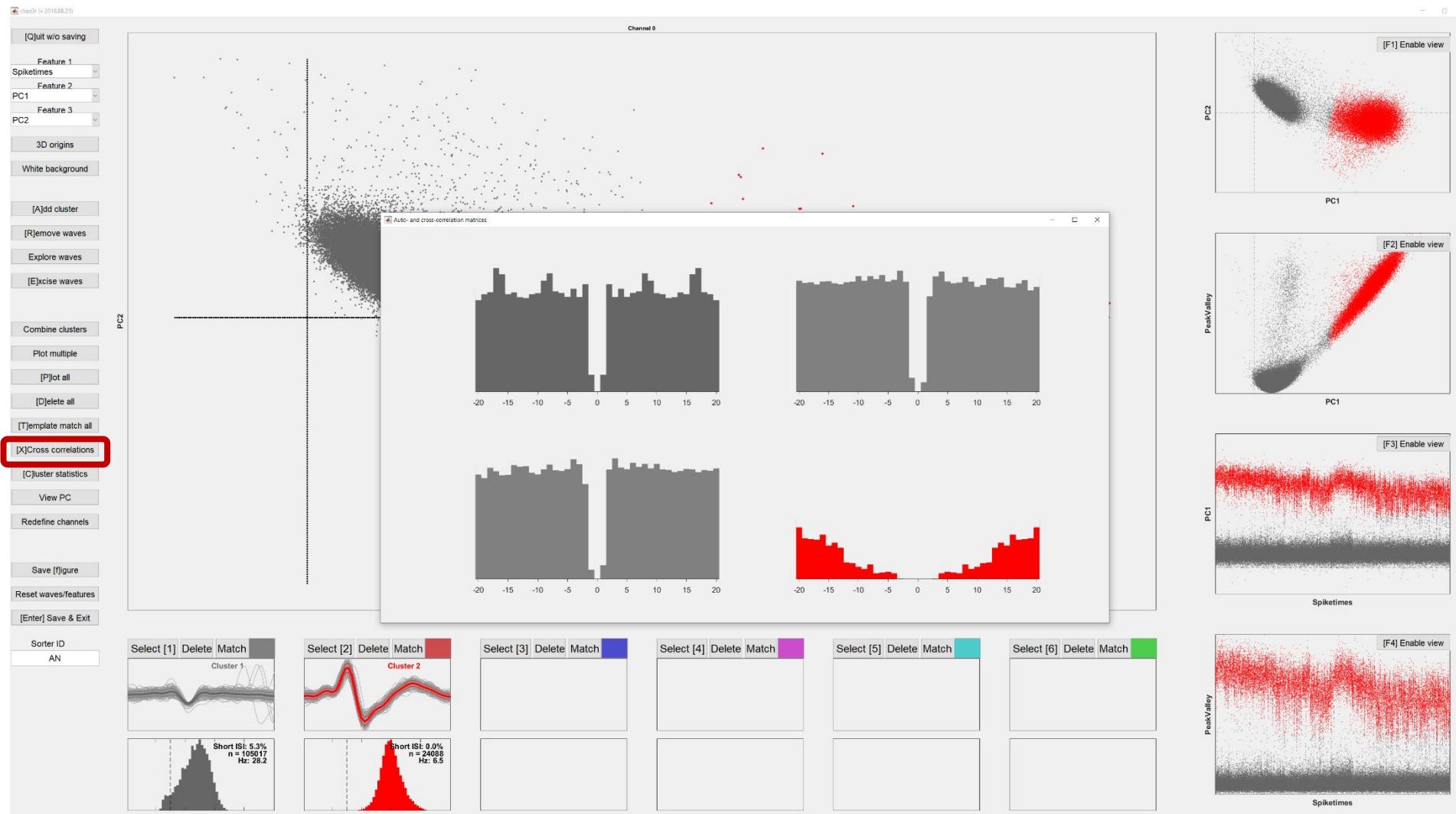
Template match all

- ‘Template match all’ then assigns each waveform in the dataset to its nearest ‘template’, defined by cluster waveform means (plotted in cluster bins below 3D sort space)



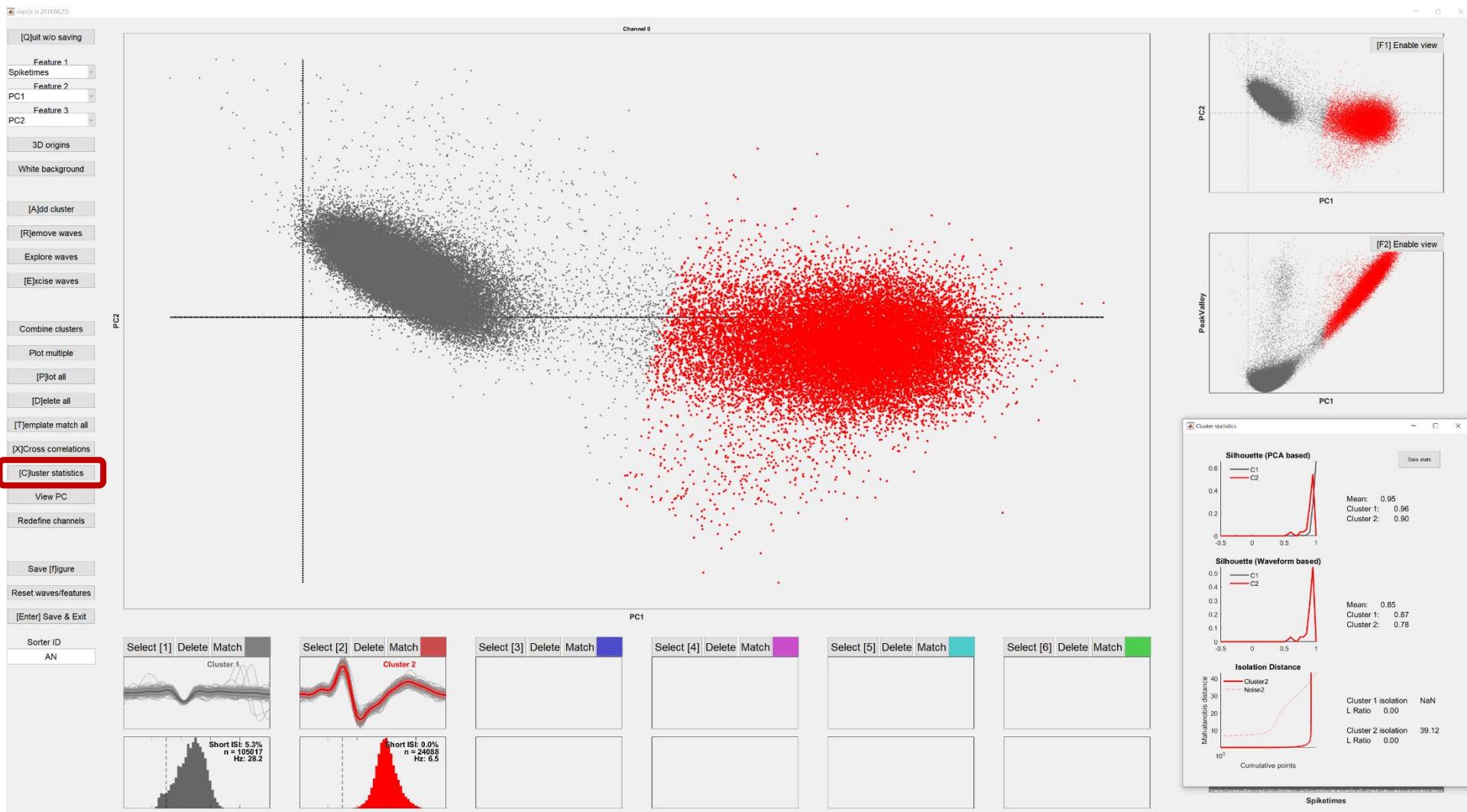
Cross correlations

- Generates plots of auto- and cross-correlation functions for all available cluster combinations in new window
- Close window to exit



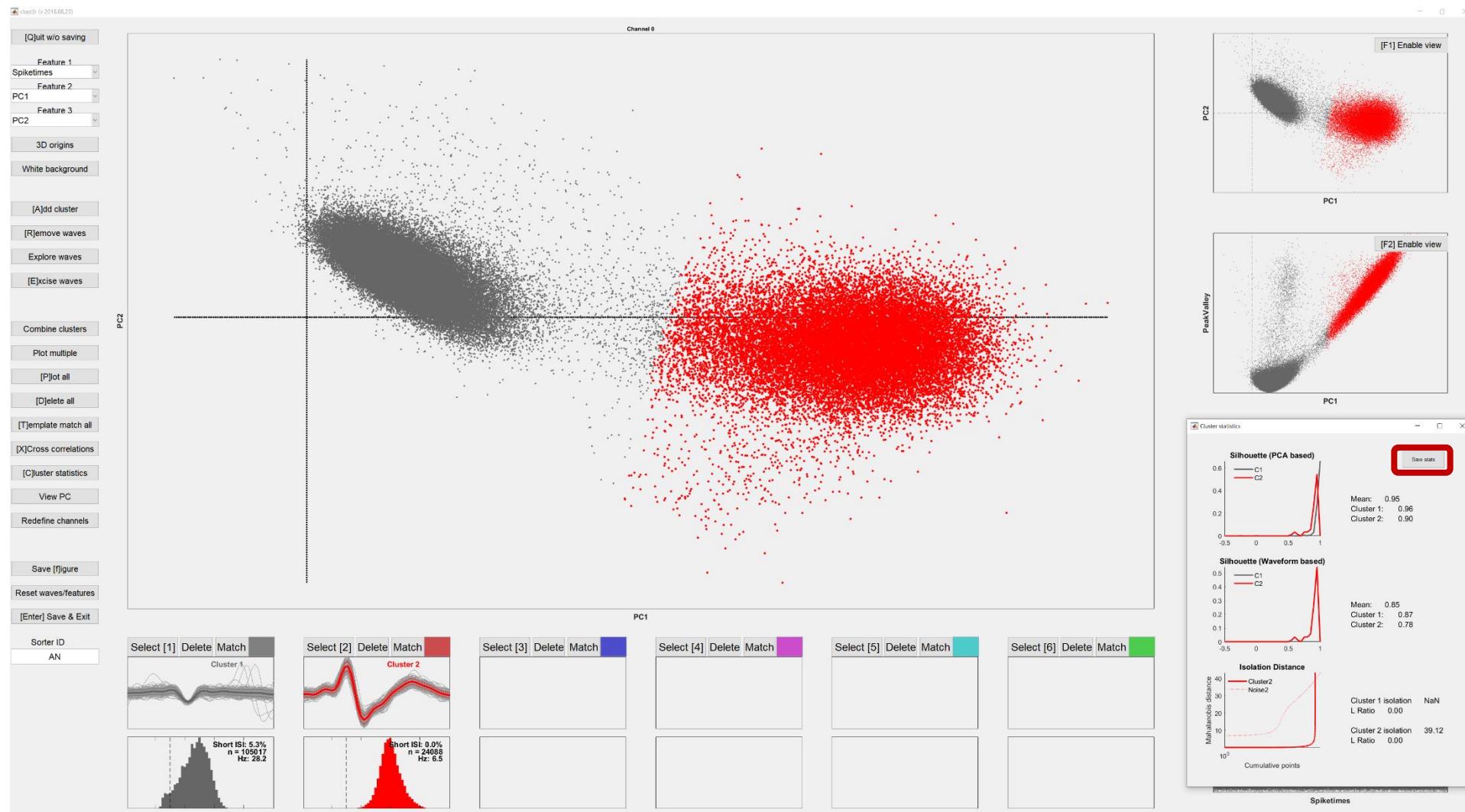
Cluster statistics

- Generates plots of various cluster isolation quality statistics in new window for all available clusters
- Close window to exit



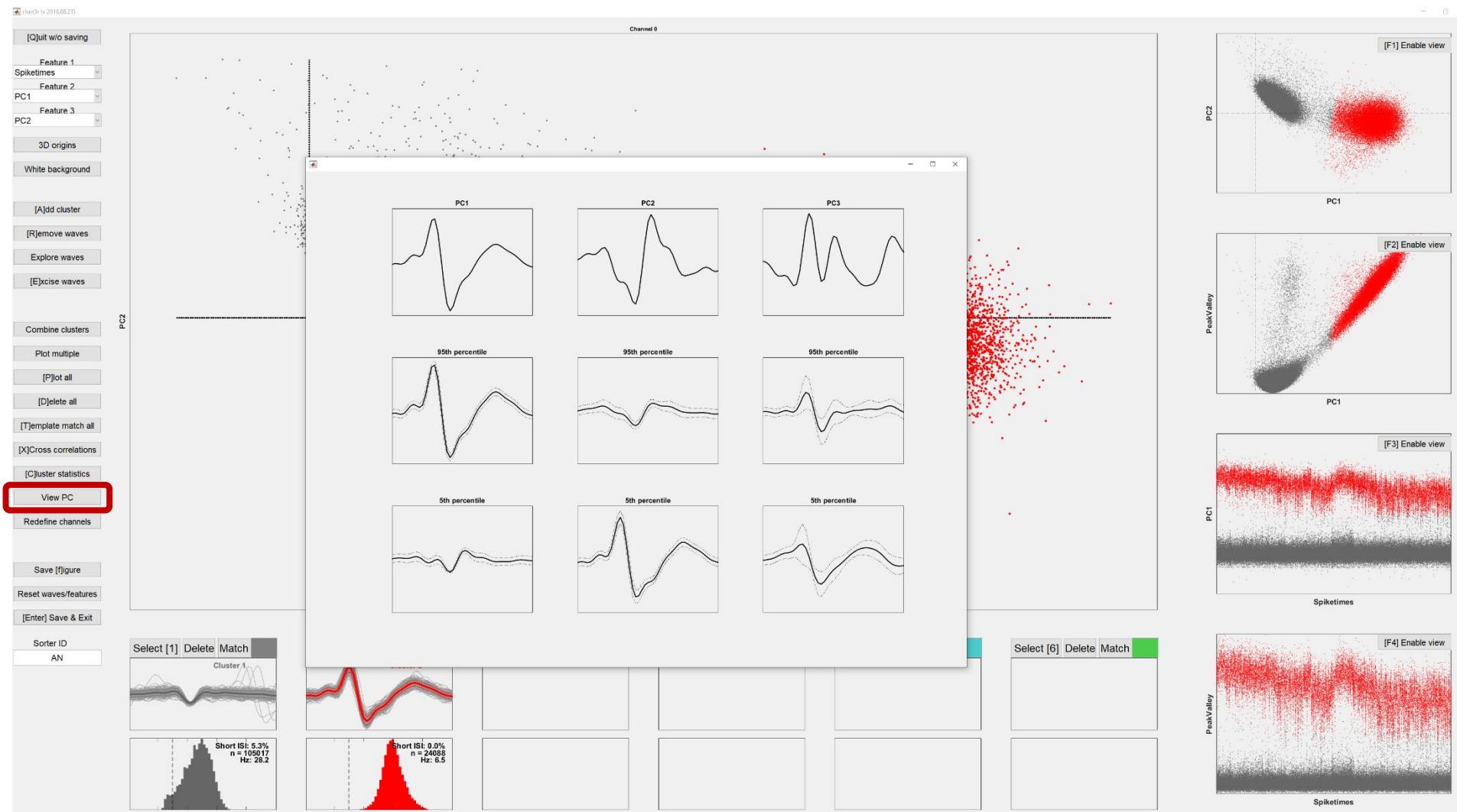
Cluster statistics: Save stats

- The statistics window includes an option to ‘Save stats’
- This allows user to store isolation statistics for a specific feature space
- If button is clicked, stats are stored in files written after user selects Save & Exit
- If button is not clicked, nothing happens (stats window for reference only)



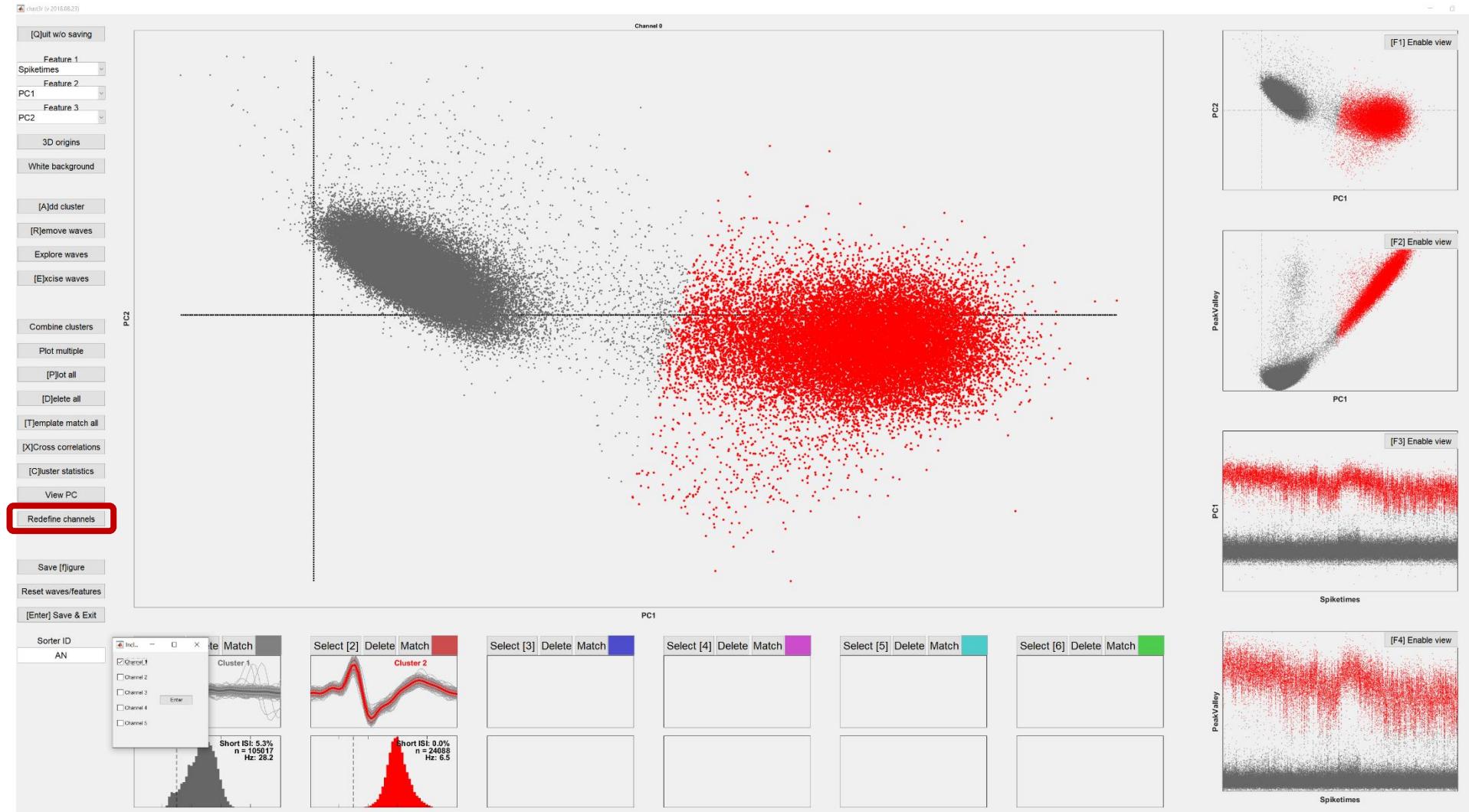
View PC

- Generates new window with plots of first three principal component vectors (top), as well as waveform samples comprising the 95th (middle) and 5th percentiles (bottom) in terms of PC projections. Close window to exit



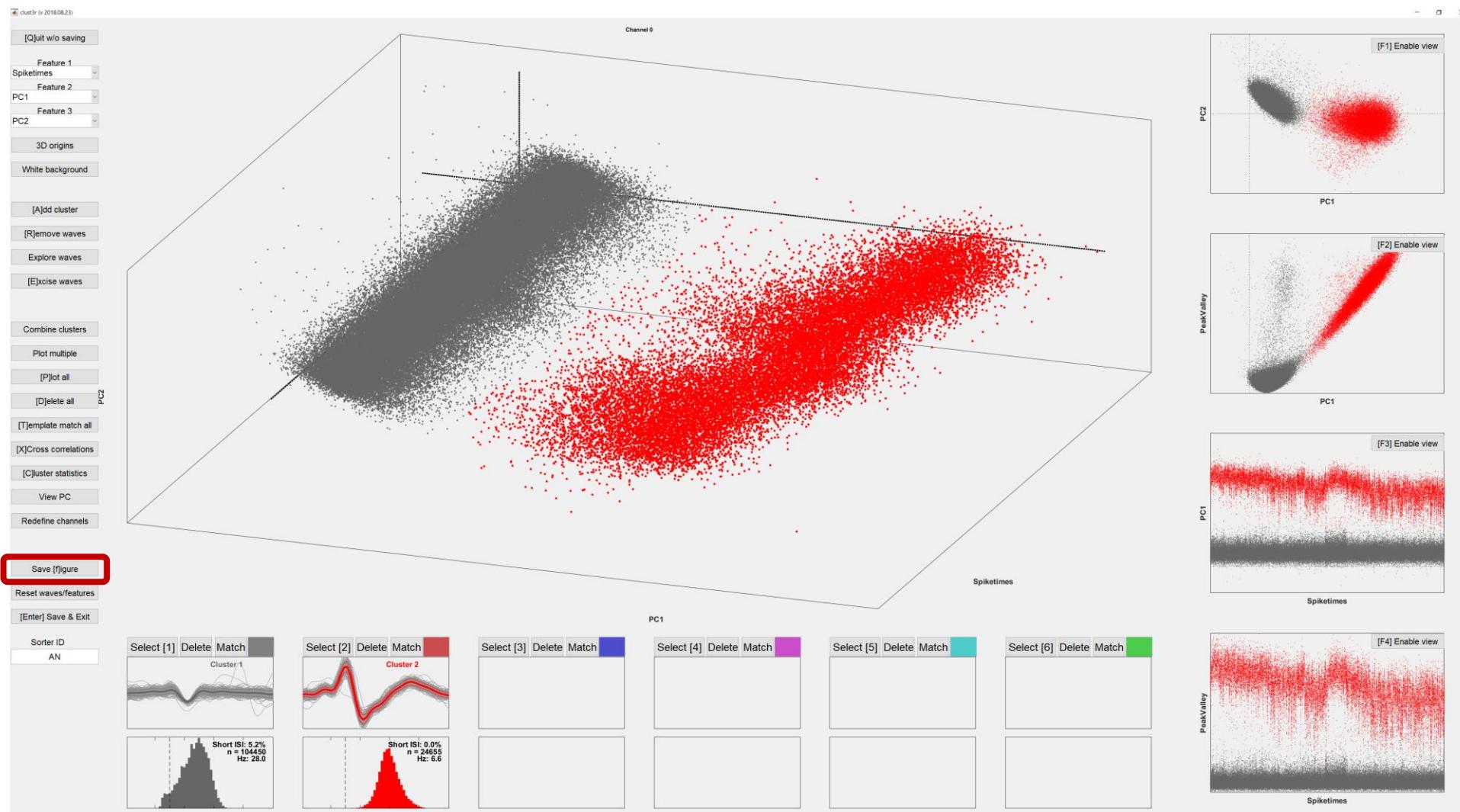
Redefine channels

- **Note:** this function works with multi-channel waveform data only
- Generates new window for selecting which channels to include in waveform dataset. All features (e.g., principal components) are recalculated and plots refreshed in reflection of the newly limited waveform dataset
- The number of samples per channel is definable by the input options structure field 'nWavSamples'. E.g., if input waveforms reflect five channels with 30 samples per channel, the waveforms input matrix will have 150 columns and a row for each spike
- By selecting Channels 1-3, waveforms are redefined to only have 90 columns



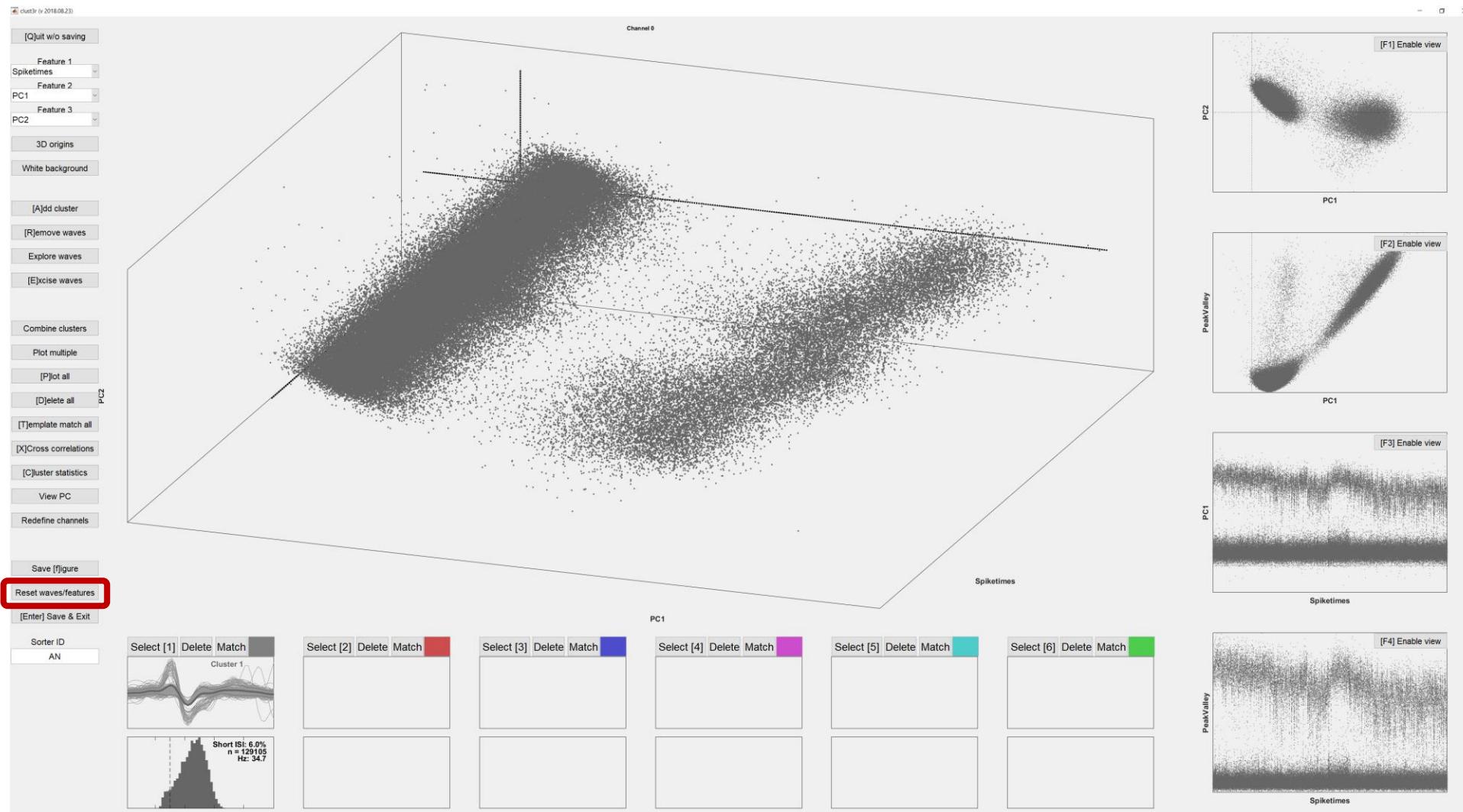
Save figure

- Stores figure of GUI in current state in path specified by input options structure field 'figpath'



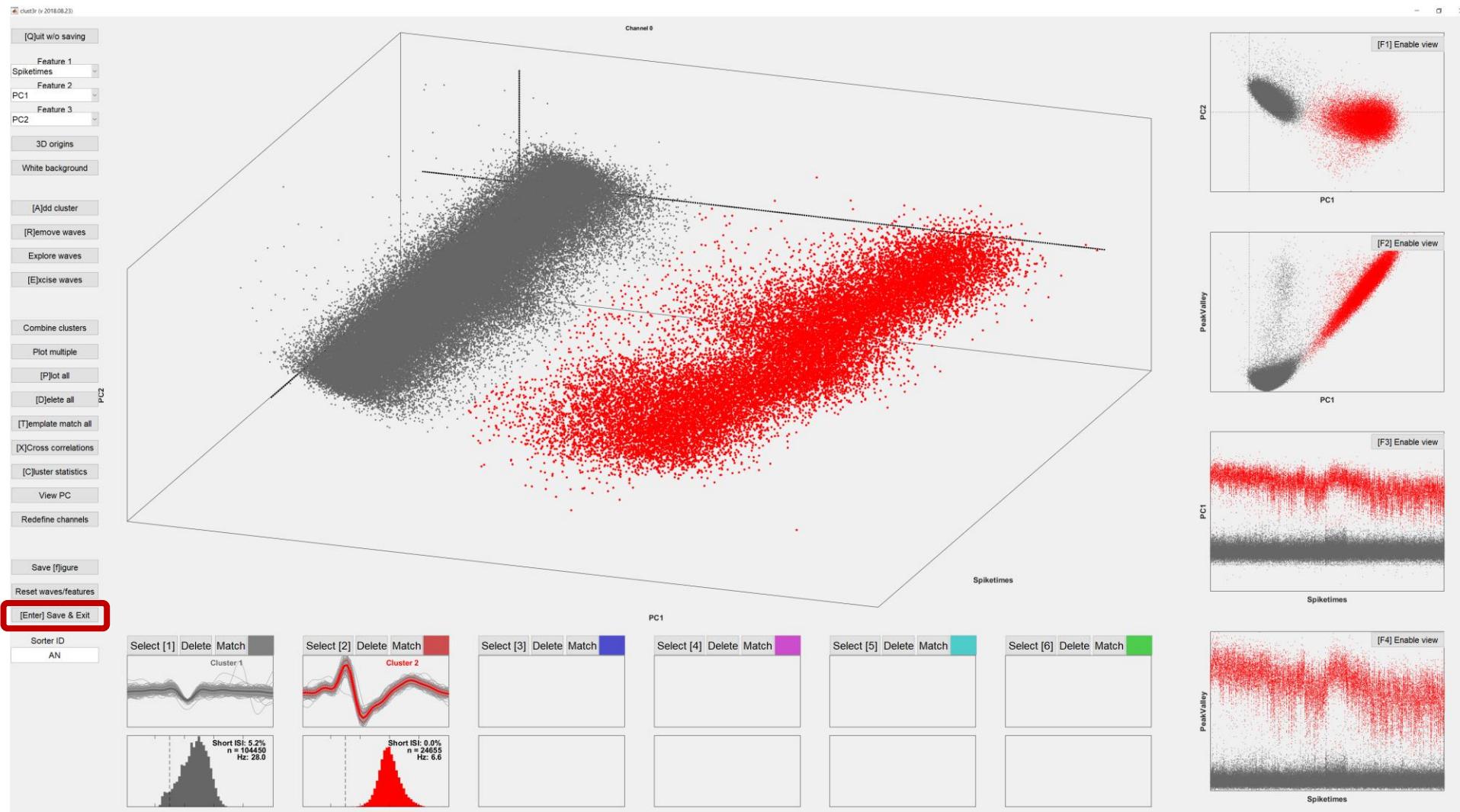
Reset waves/features

- Restores data and GUI state (waveforms, features, etc.) to default launch state. Deletes all clusters, restores excised waveforms, etc.



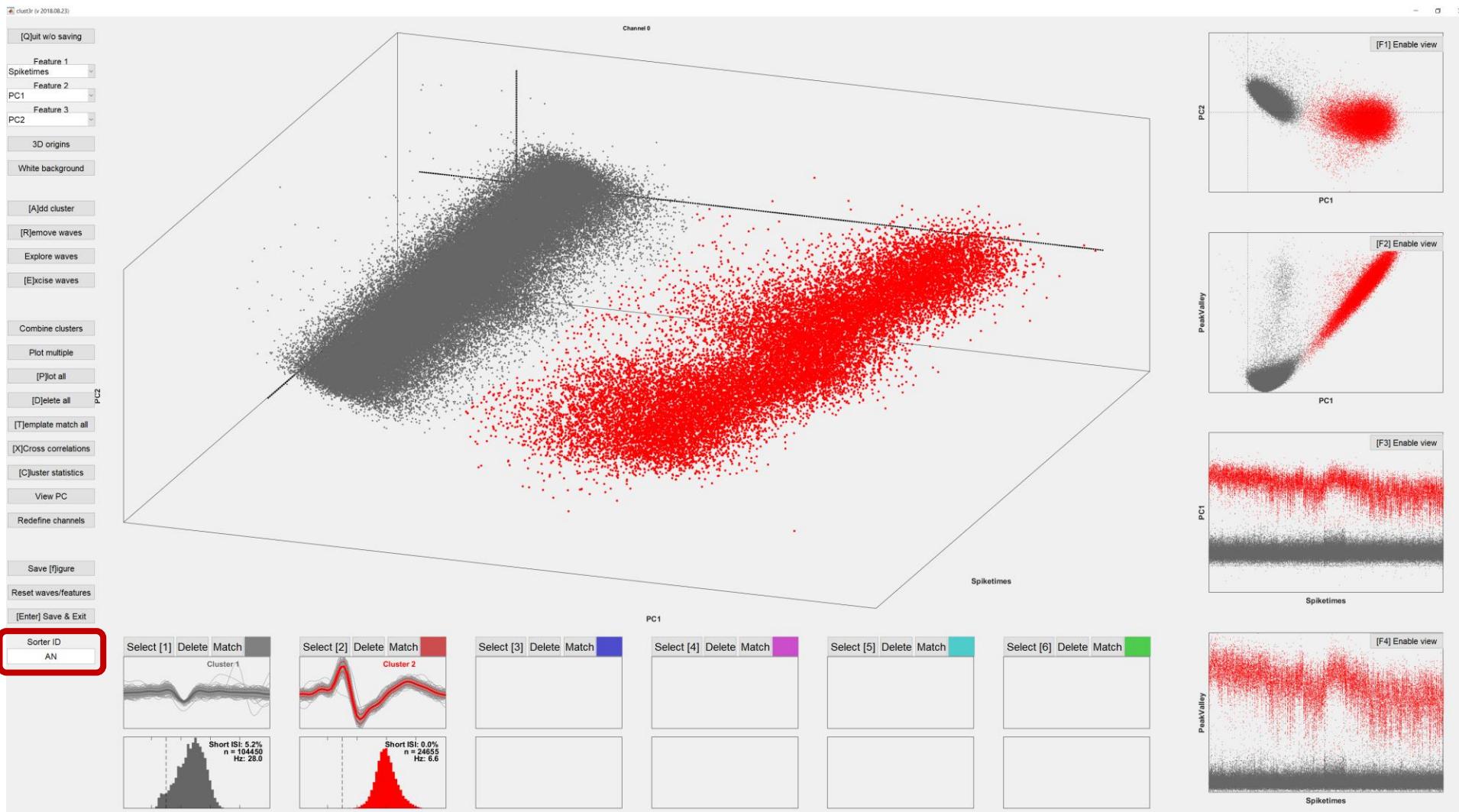
Save & Exit

- Stores data files (.mat) in path specified by input options structure field 'savepath', saves image of final GUI state and cluster statistics in 'figpath', and exits program
- **Note:** Before saving, make sure units occupy lowest available unit slot
- E.g., if there are two sorted units, they should be assigned to Clusters 2 and 3 (the first two unit slots next to unsorted Cluster 1).
- E.g., don't save if Clusters 2 and 4 are populated but Cluster 3 is empty (this is possible if Clusters 2-4 are populated and then Cluster 3 is deleted)



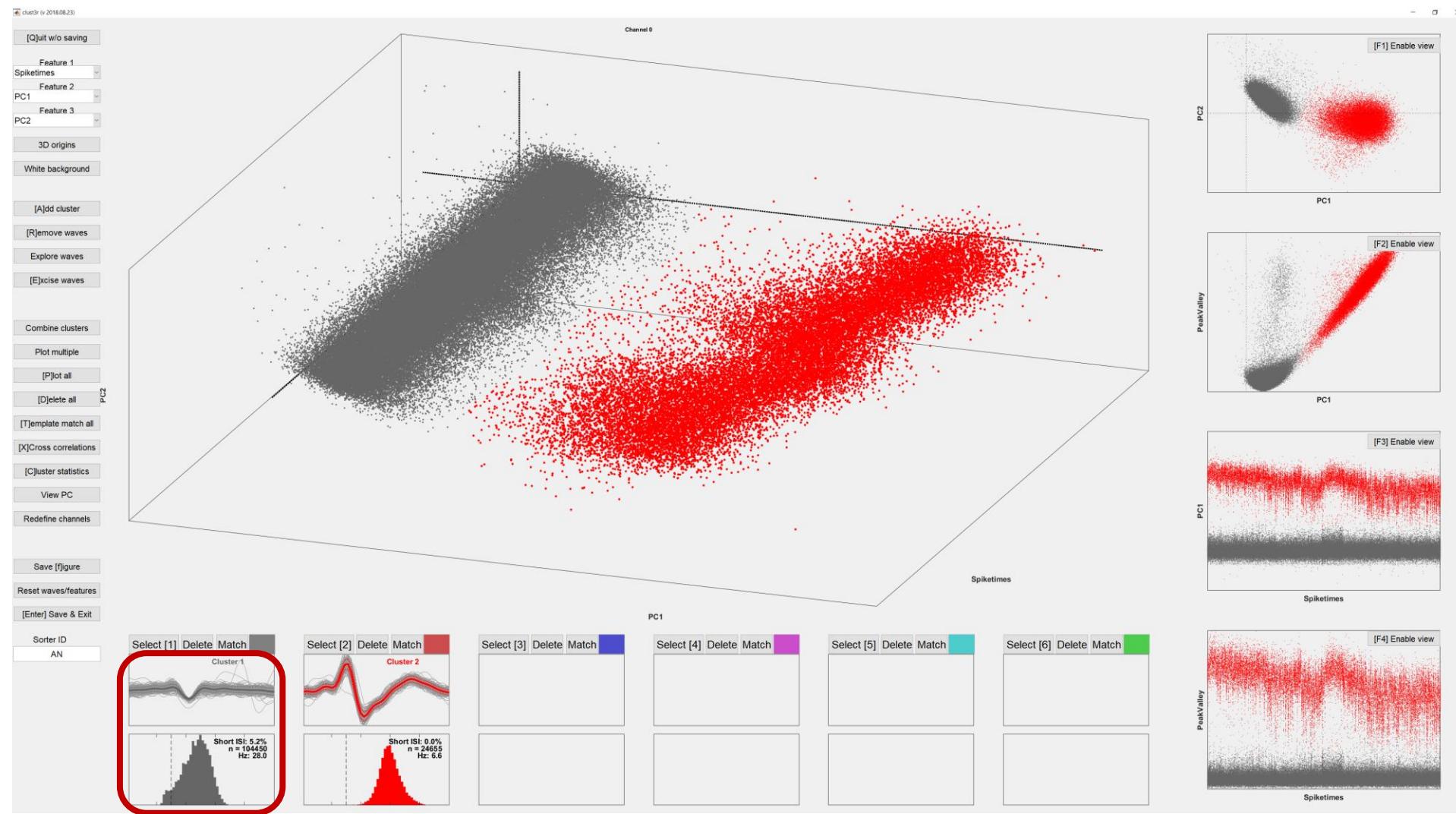
Sorter ID

- Text box to specify user identity



Cluster summary plots

- Top plot shows individual waveform samples (thin, gray) and waveform mean and standard deviation (thick, colored)
- Bottom plot interspike-interval histogram (log10 scale spacing between 0.1 and 10,000 ms) with dotted line corresponding to 3 ms. Text indicates percentage of spikes below 3 ms (Short ISI), the number of spikes (n), and the spike rate (Hz)



Cluster buttons

- ‘Select’ plots the cluster individually
- ‘Delete’ returns all data points to Cluster 1 and clears textbox
- ‘Match’ assigns all waveforms of the cluster to nearest template defined by waveform means of remaining available clusters (similar to delete except that data points may be assigned to clusters other than Cluster 1)
- Textbox (colored) is a field for entering notes or codes, e.g., indicating sort quality of the unit

