

Doric Lenses' Data Analysis Software:

*danse*TM



Data Analysis for Neuroscience Experiments

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Introduction

Experimental Pipeline



Compatible Data

Photometry

From *DNS*:

- .doric files
- v5 .doric files
- v5 CSV files

CSV/Excel

Compatible with:

- TDT
- Neurophotometrics

Microscopy

From *DNS*:

- .doric files
- v5 .doric files
- .avi

.tif/.tiff format

Compatible with:

- Inscopix
- UCLA Miniscope

Behavior

.doric files:

- DIO (TTL signals)
- AIN (Analog signals)
- Video (Beh Camera)
- Keypress Events

Video (.mp4)

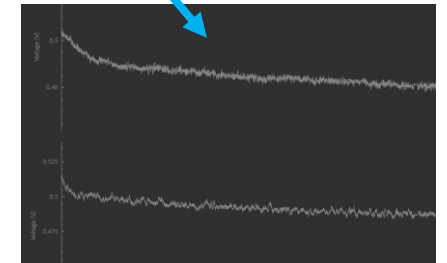
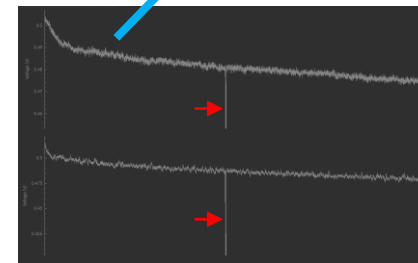
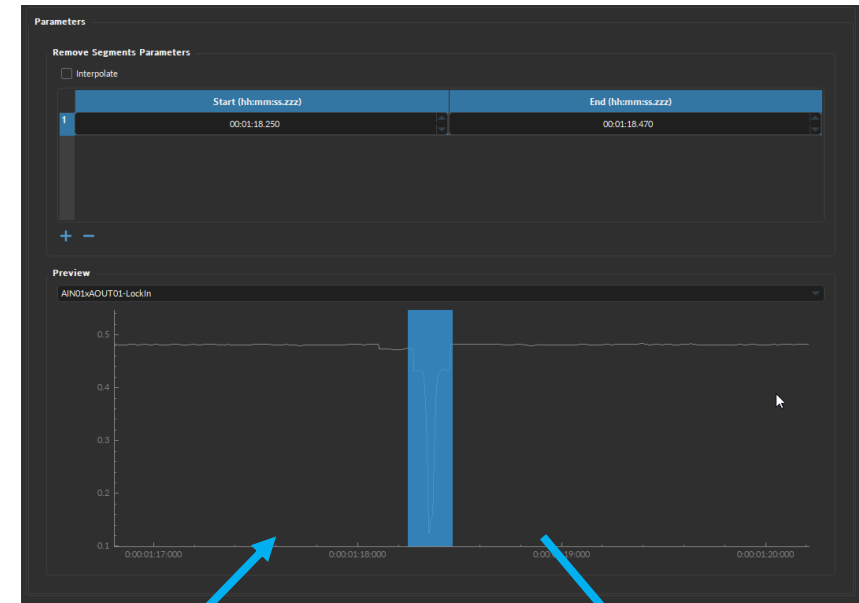
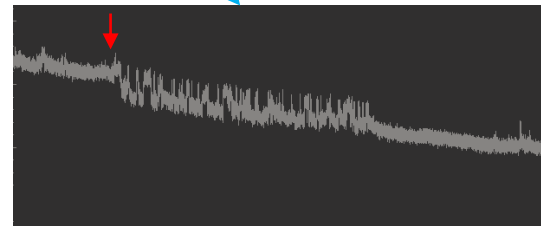
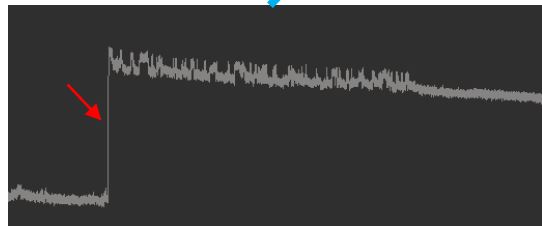
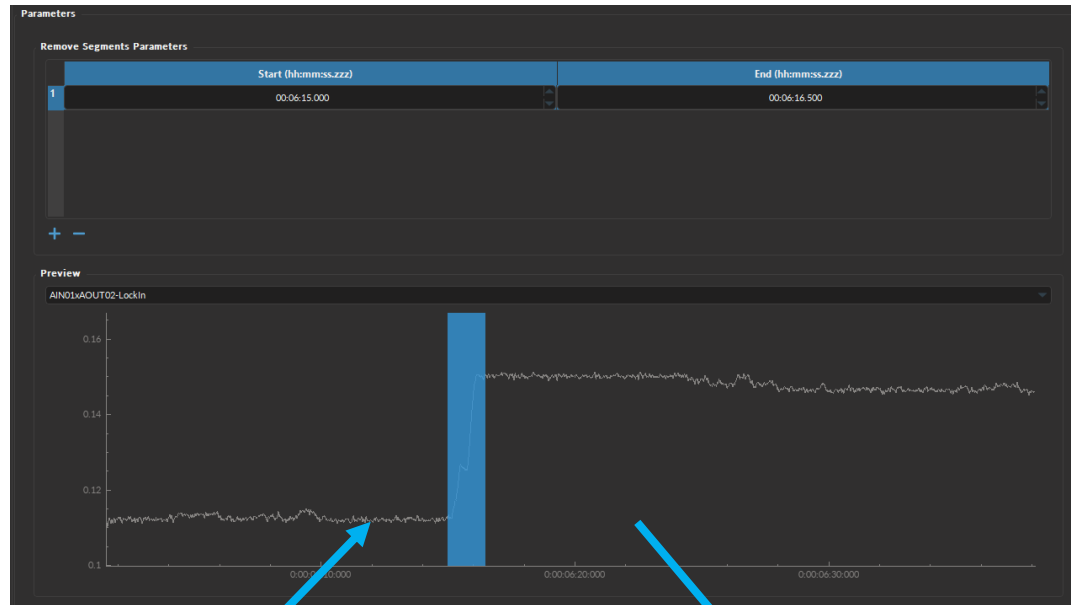
CSV/Excel

Compatible with:

- Ethovision
- Anymaze
- DeepLabCut

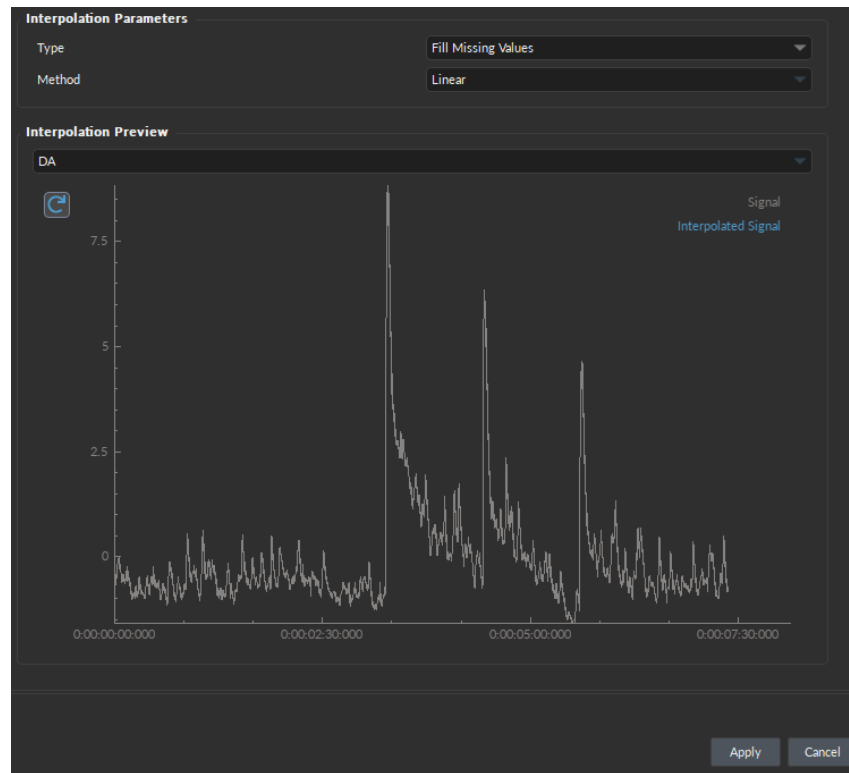
General Signal Processing

Remove Artefact operations

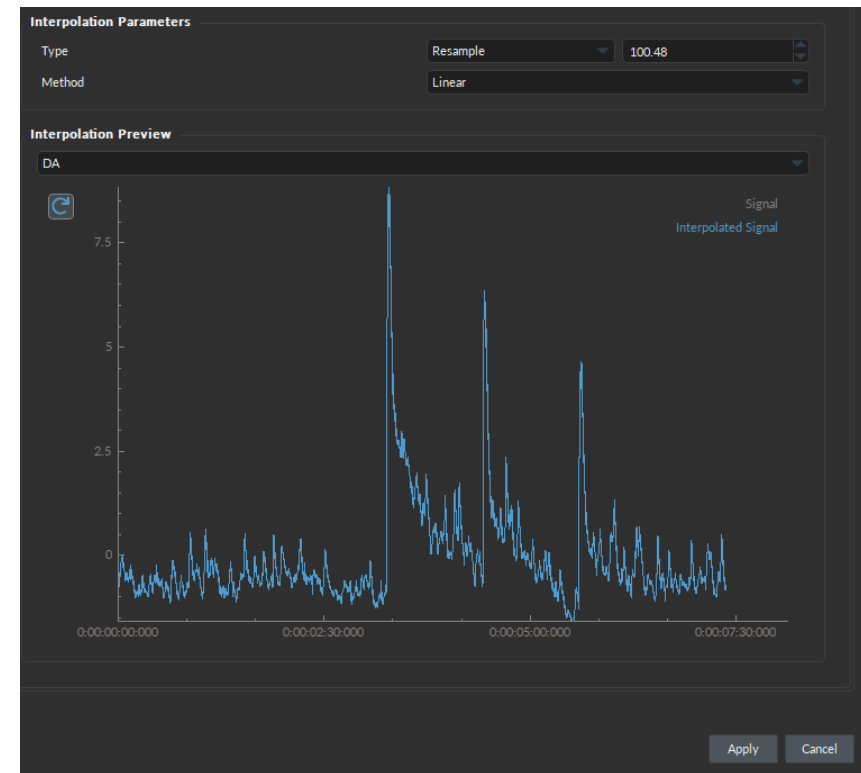


Interpolation operation

Fill in missing values:



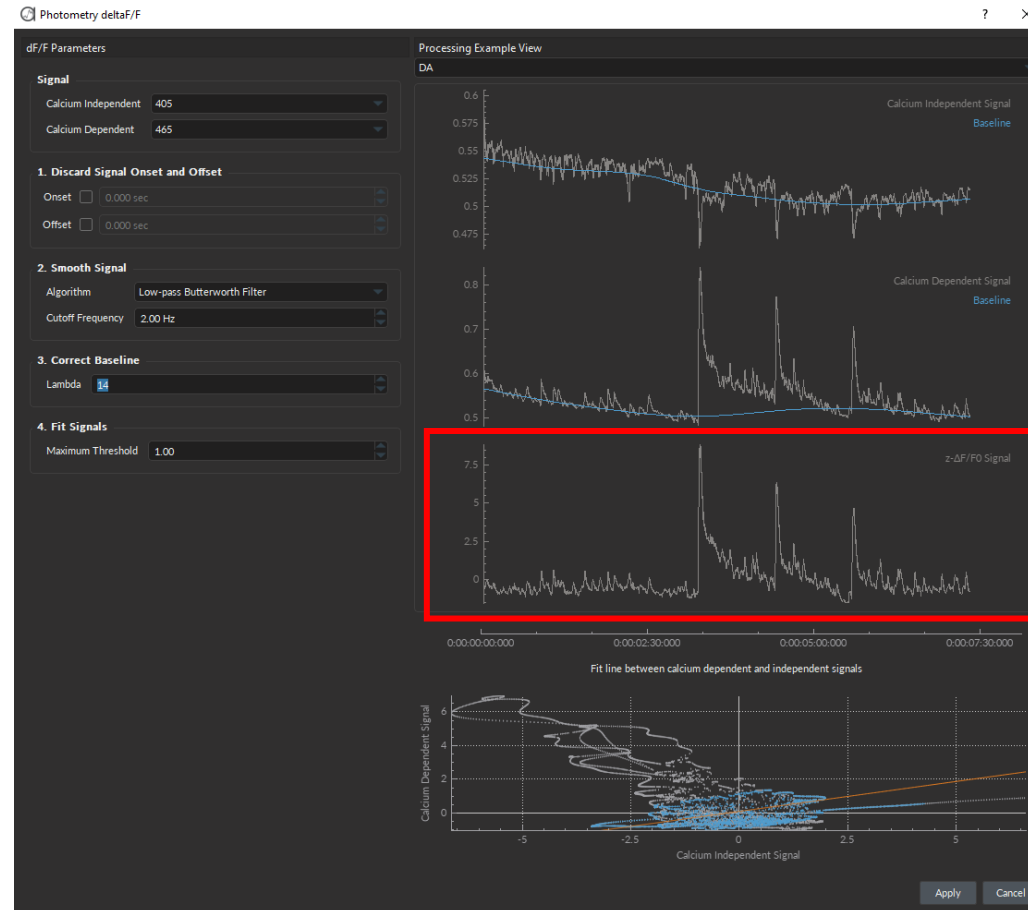
Resample:



Fiber Photometry

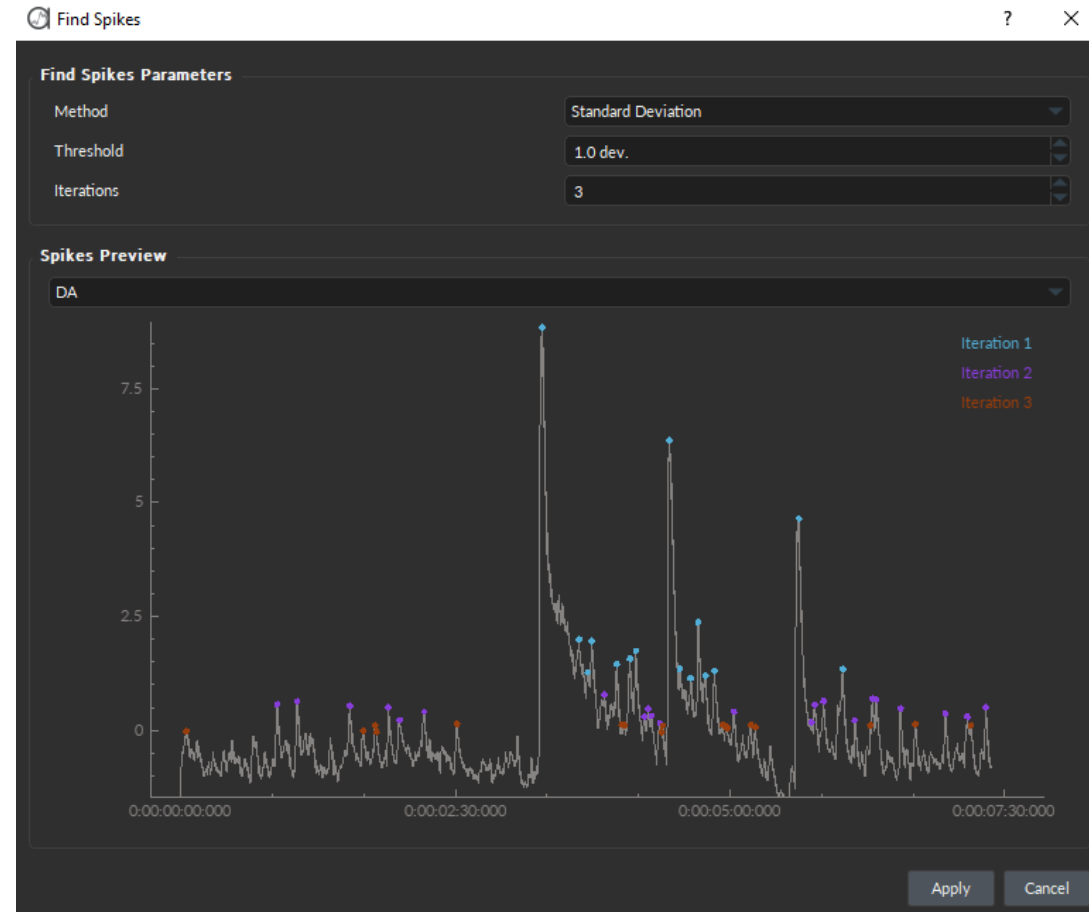
Calculate z-DF/F0

[Tutorial Video](#)



Z-score
DF/F0

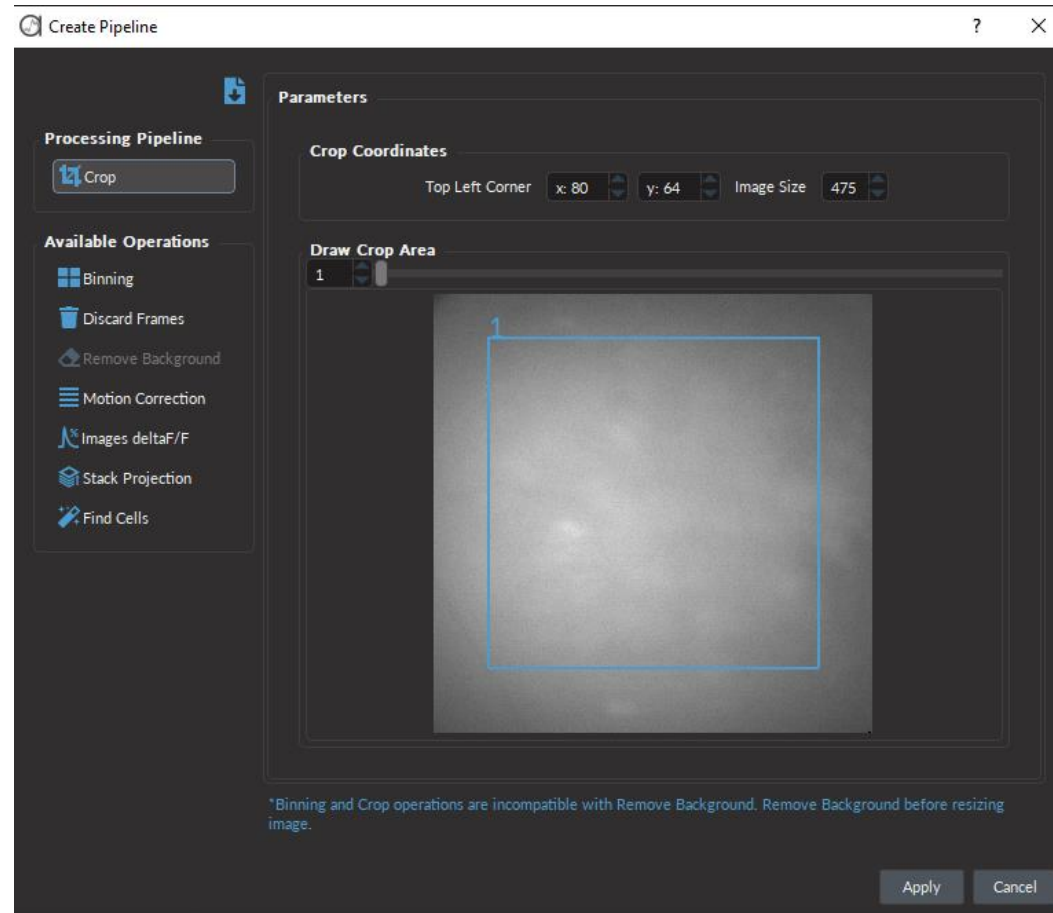
Find Spikes



Microscopy

Image Processing Operations

- Crop
- Binning
- Discard Frame
- Motion Correction
- Stack Projection
- Stack Projection



Find Cells Algorithms

CalmAn CNMF-E:

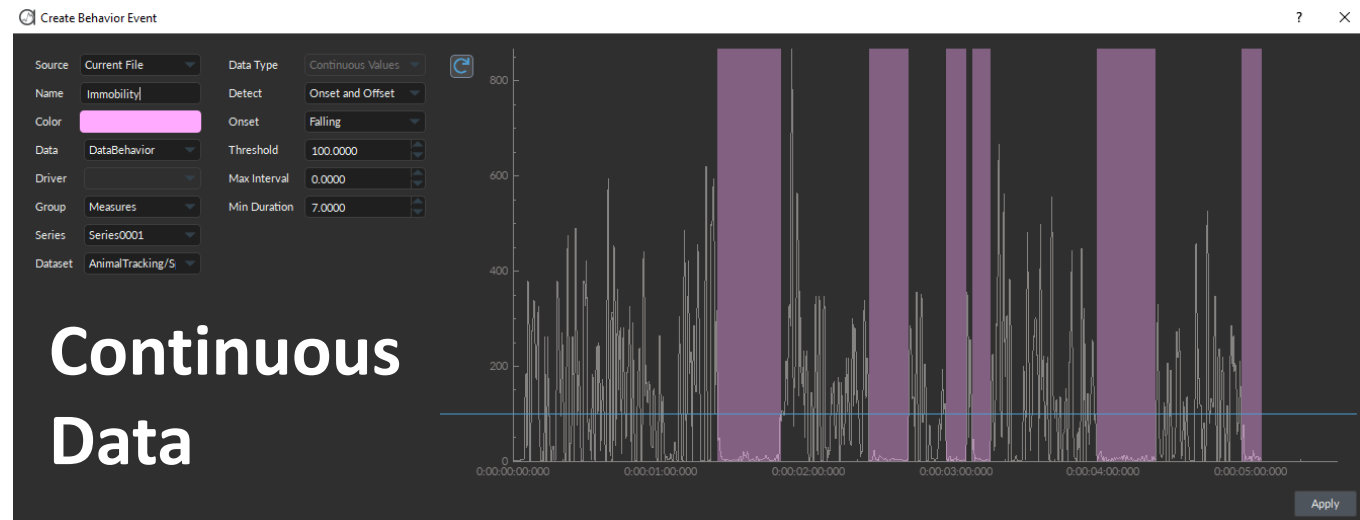
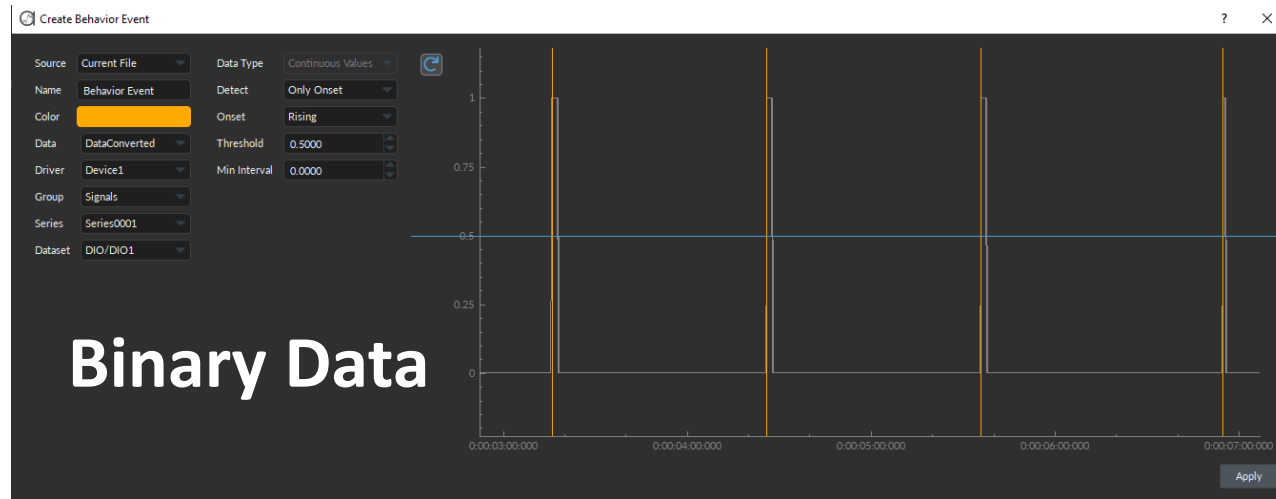
The screenshot shows the 'Find Cells' software interface for the CalmAn CNMF-E algorithm. The 'Find Cells Parameters' panel on the left includes: Algorithm (CalmAn CNMF-E), Cross Registration (unchecked), Motion correction (checked), Neuron Diameter (10 px - 31 px), Peak to Noise Ratio (10.00), Local Correlation (0.80), Spatial Downsampling (1), Temporal Downsampling (1), and Advanced Parameters (unchecked). The 'Preview' panel shows a grayscale image of a neuron with a 'Peak to Noise Ratio' slider set to 10.00. The 'Temporal Downsampling' is set to 1. The 'PNR' and 'Correlation' tabs are visible, with 'PNR' selected. The 'Apply' and 'Cancel' buttons are at the bottom.

MiniAn CNMF:

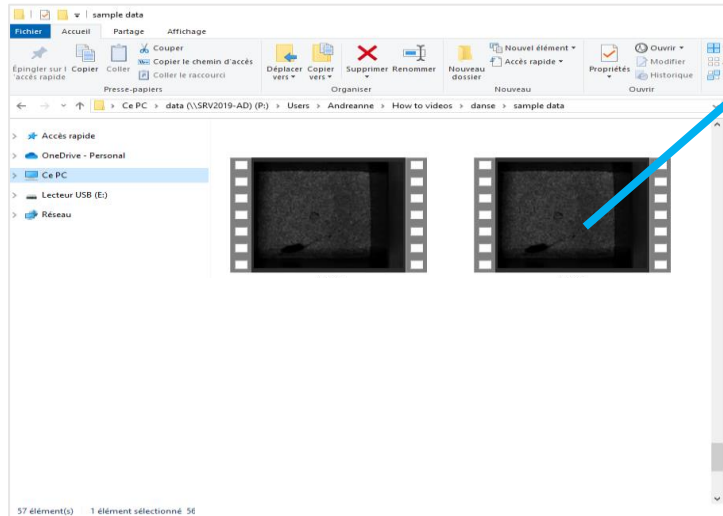
The screenshot shows the 'Find Cells' software interface for the MiniAn CNMF algorithm. The 'Find Cells Parameters' panel on the left includes: Algorithm (MiniAn CNMF), Cross Registration (unchecked), Motion correction (checked), Neuron Diameter (10 px - 31 px), Noise Frequency (0.30), Correlation Threshold (0.80), Spatial Sparse Penalty (0.03), Temporal Sparse Penalty (0.30), Spatial Downsampling (1), Temporal Downsampling (1), and Advanced Parameters (unchecked). The 'Preview' panel shows a 'Max Projection and Seeds' view with a color scale from 0 to 40. The 'Seeds' are 'Refined' and 'Merged'. The 'Initialization' and 'Sparse Penalties' tabs are visible, with 'Initialization' selected. A 'Noise Frequency Plot' is shown at the bottom, with 'Signal' and 'Noise' traces. The 'Seed' is set to 0. The 'Apply' and 'Cancel' buttons are at the bottom.

Behavior

Extract Behavior Events from measures



Link Behavior Video



Link Behavior Video

video.mp4

Name BehVideo

Series Series0001

No time file selected

Time

Start Time difference -2.000 s 11:59:58.000

Recording started at 12:00:00.000

If no file with timestamps is selected, the time vector is generated from the video average FPS. But take into account that the FPS is not reliable source of video timestamps.

Preview

1

Apply

Behavior Start Δt Neural Recording Start

The diagram shows a horizontal timeline with two vertical tick marks. The left tick mark is labeled 'Behavior Start' and the right tick mark is labeled 'Neural Recording Start'. A red double-headed arrow between the two tick marks is labeled with the Greek letter Δt .

Import behavior data

	A	B	C
1	Binary	Continuous	Time
2	0	0	0
3	0	0	0.0083
4	0	0	0.0166
5	0	0	0.0249
6	0	0	0.0332
7	0	0	0.0415
8	0	0	0.0498
9	0	0	0.0581
10	0	2.6734214	0.0664
11	0	2.6734214	0.0747
12	0	2.6734214	0.083
13	0	2.6734214	0.0913
14	0	3.7807888	0.0996
15	0	154.71235	0.1079
16	0	186.16306	0.1162
17	0	27.911339	0.1245
18	0	380.0116	0.1328
19	0	337.0208	0.1411
20	0	0	0.1494
21	0	0	0.1577
22	0	273.16036	0.166

Create Behavior Measure

Source: CSV File

Name: TTL signal

Unit:

or Events/CSV file/BehaviorEvents2.csv

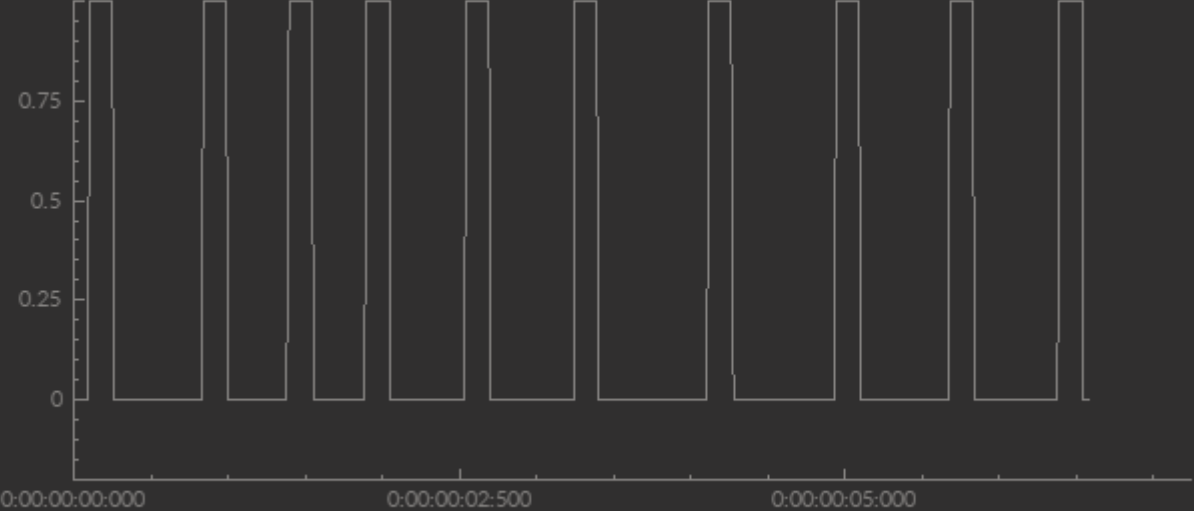
Series: Series0001

Time: Time

Values: Binary

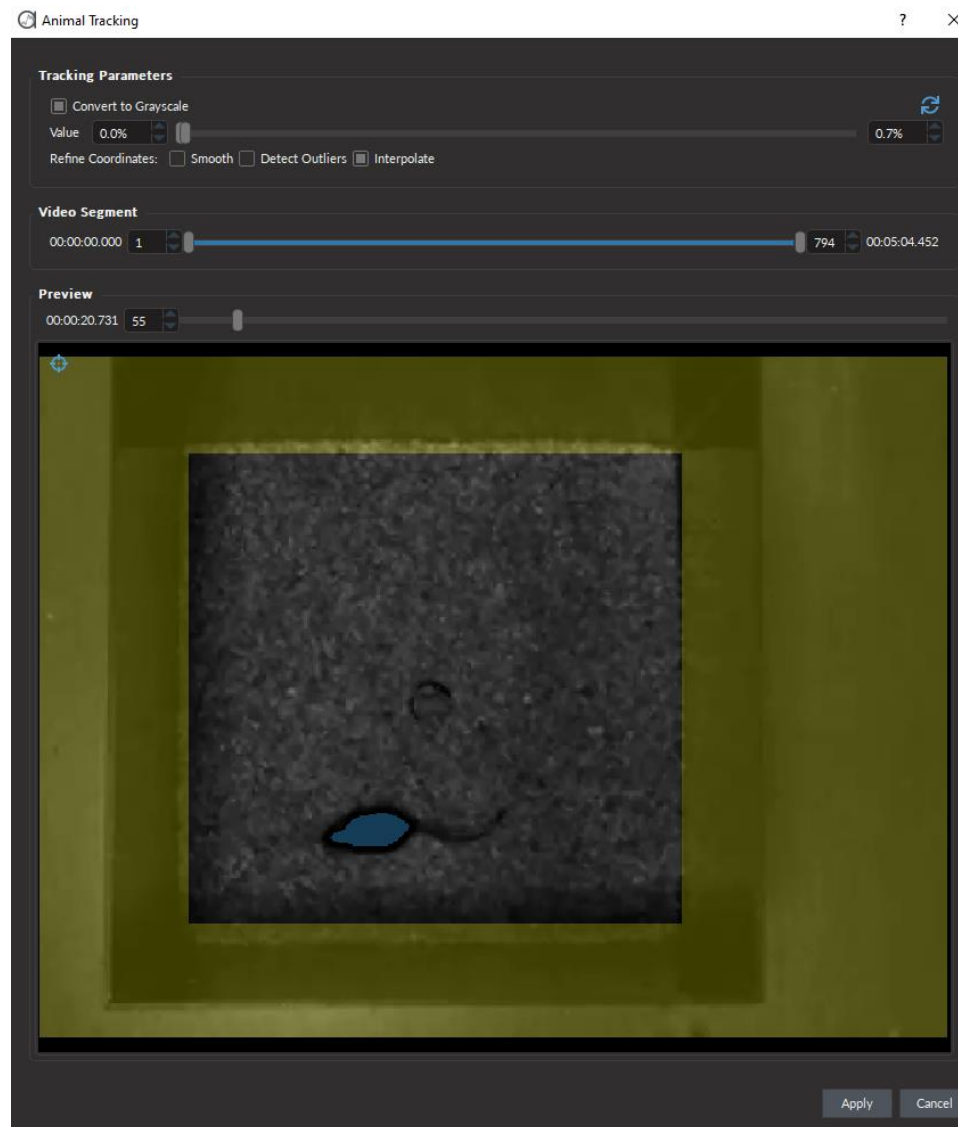
Start: Computer time 12:00:00.000

Recording started at 12:00:00.000

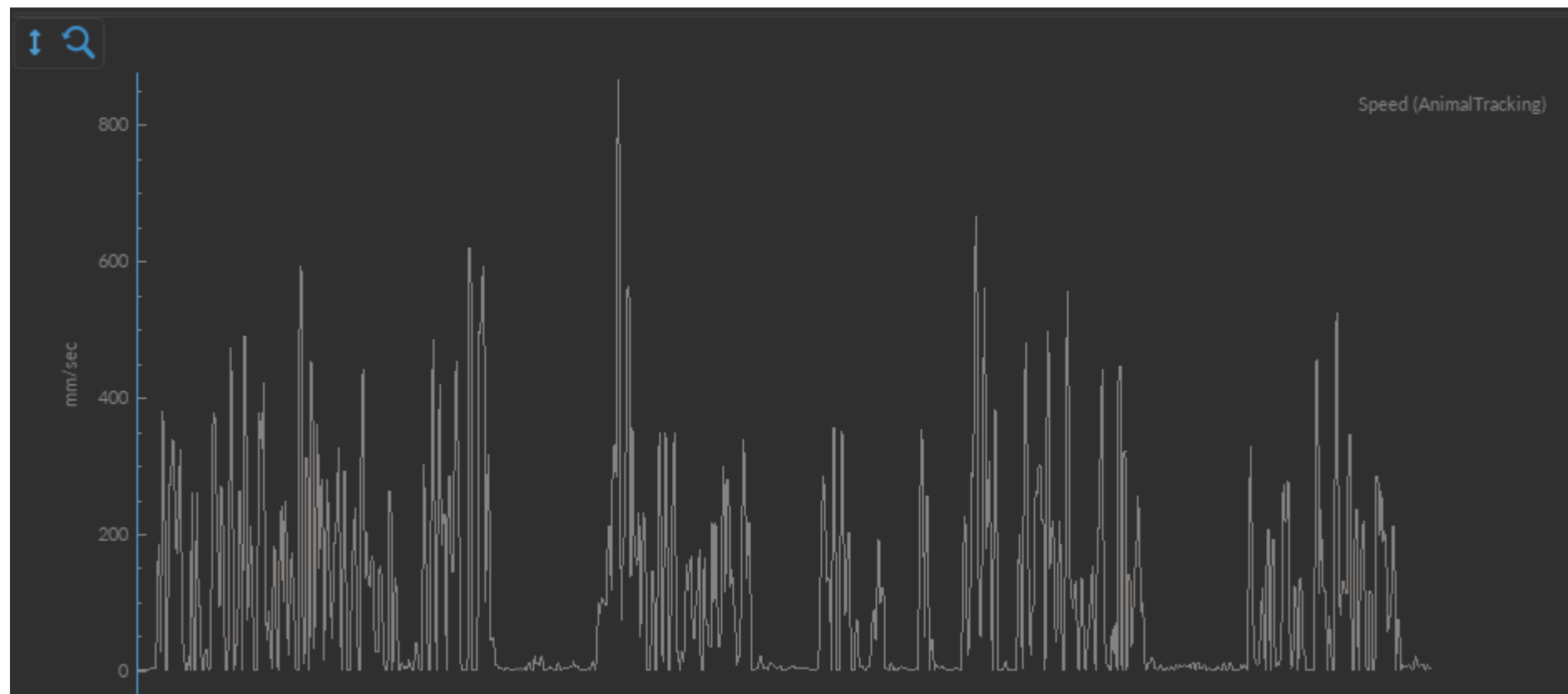


Apply

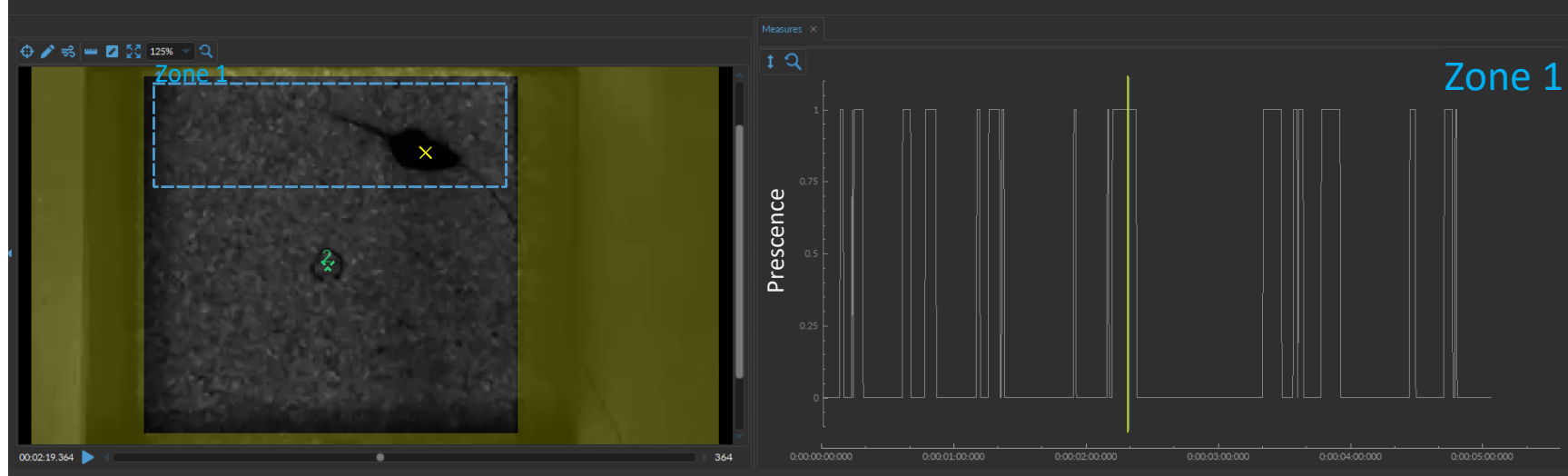
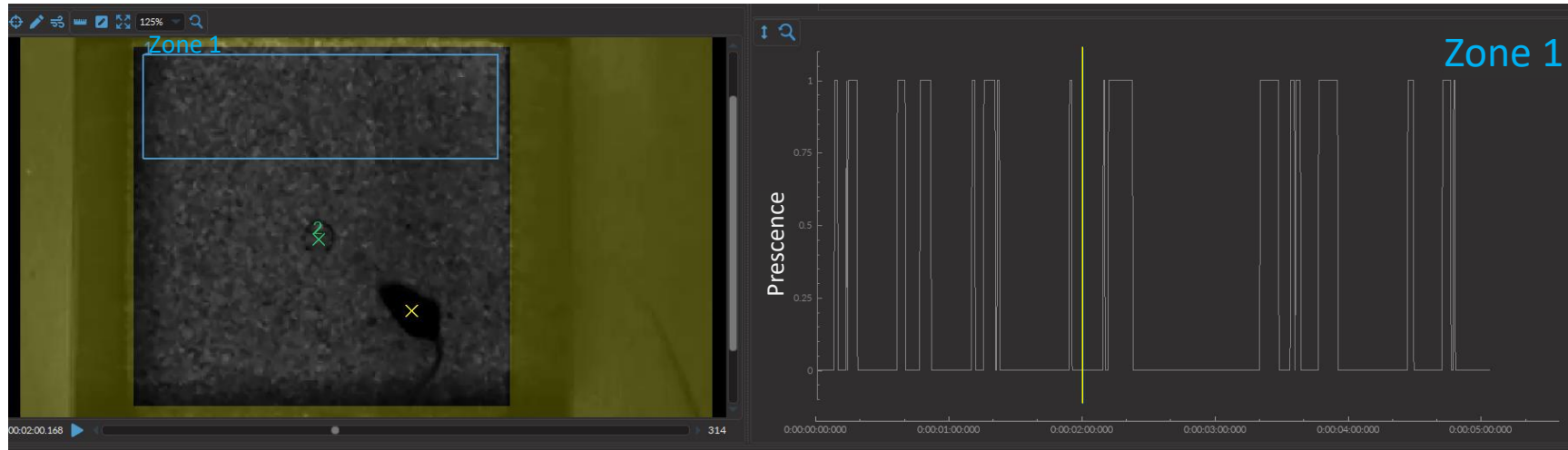
Animal Tracking



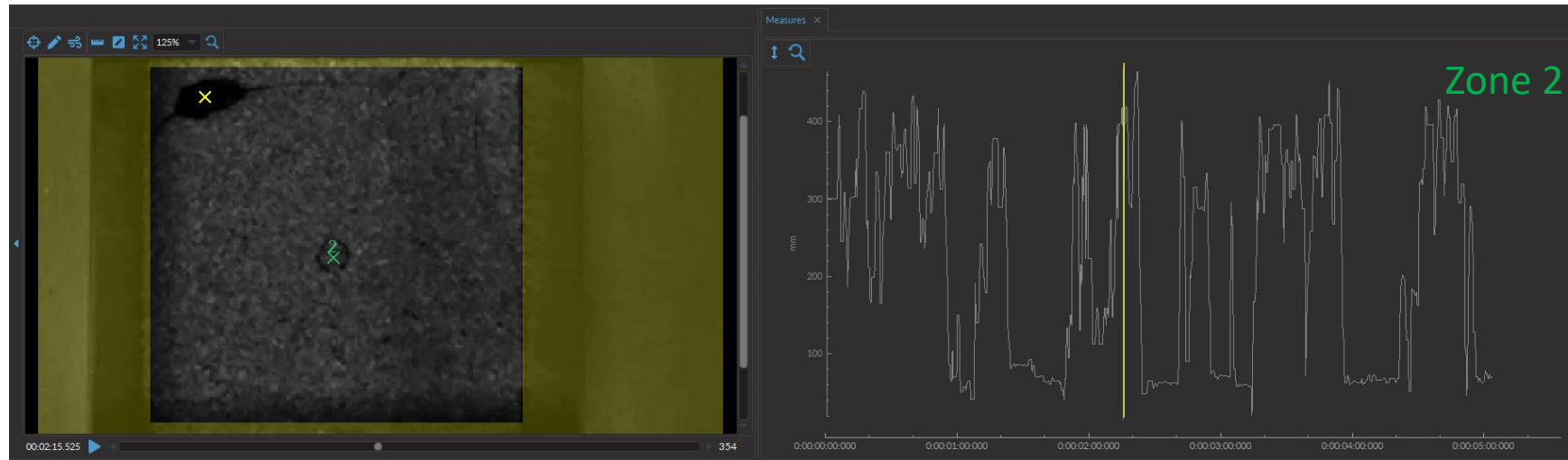
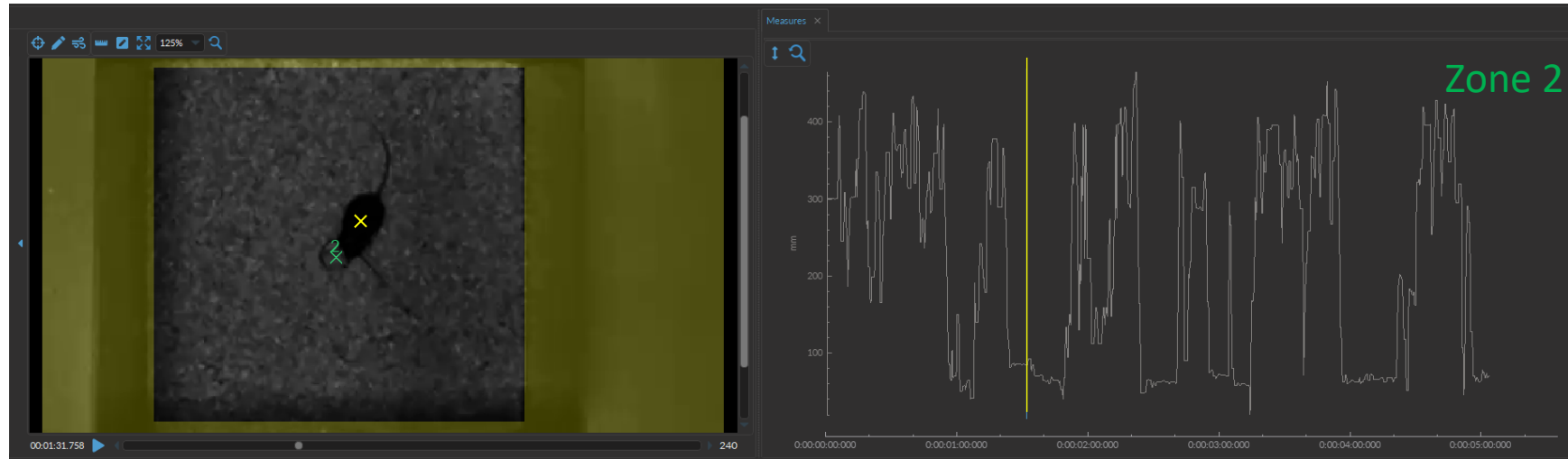
Animal Speed



Animal Presence in Zone

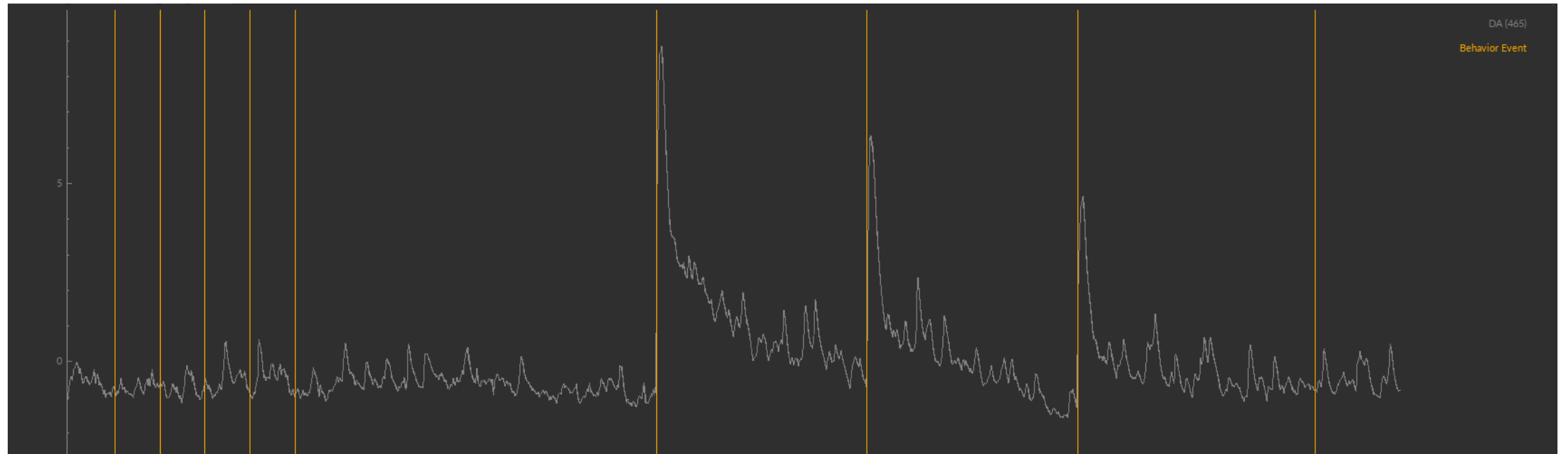


Animal Distance from Point



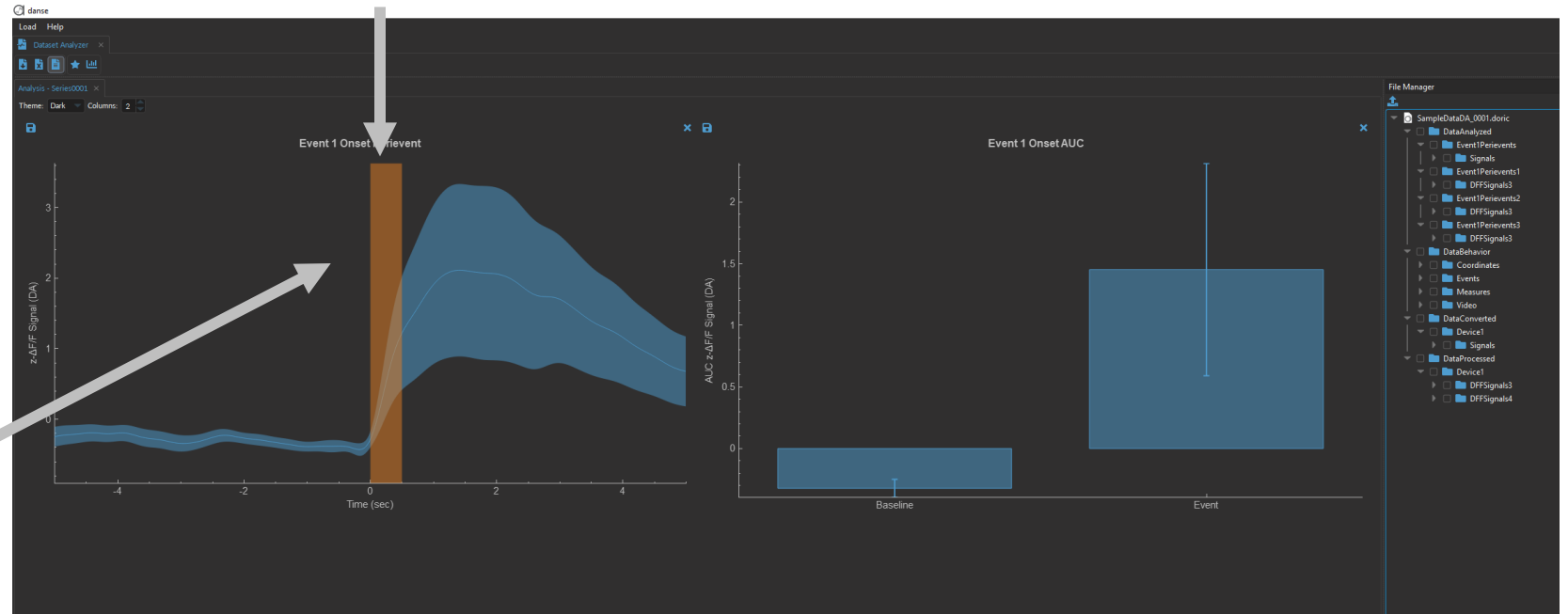
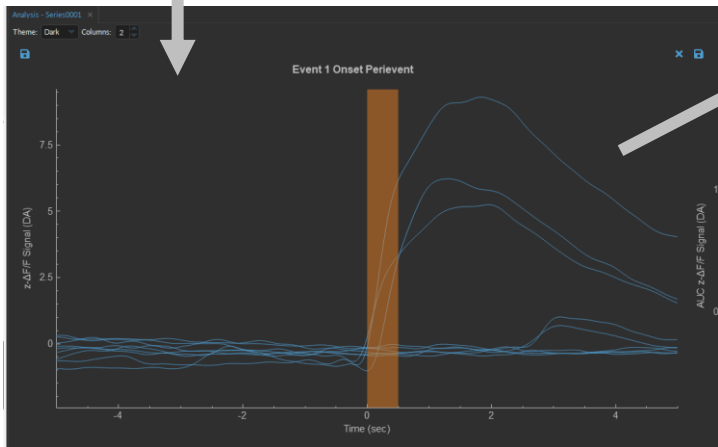
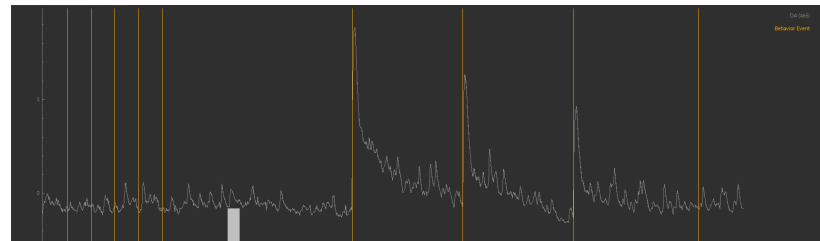
Combining neural and
behavior data

Load Behavior Event over Neural Data



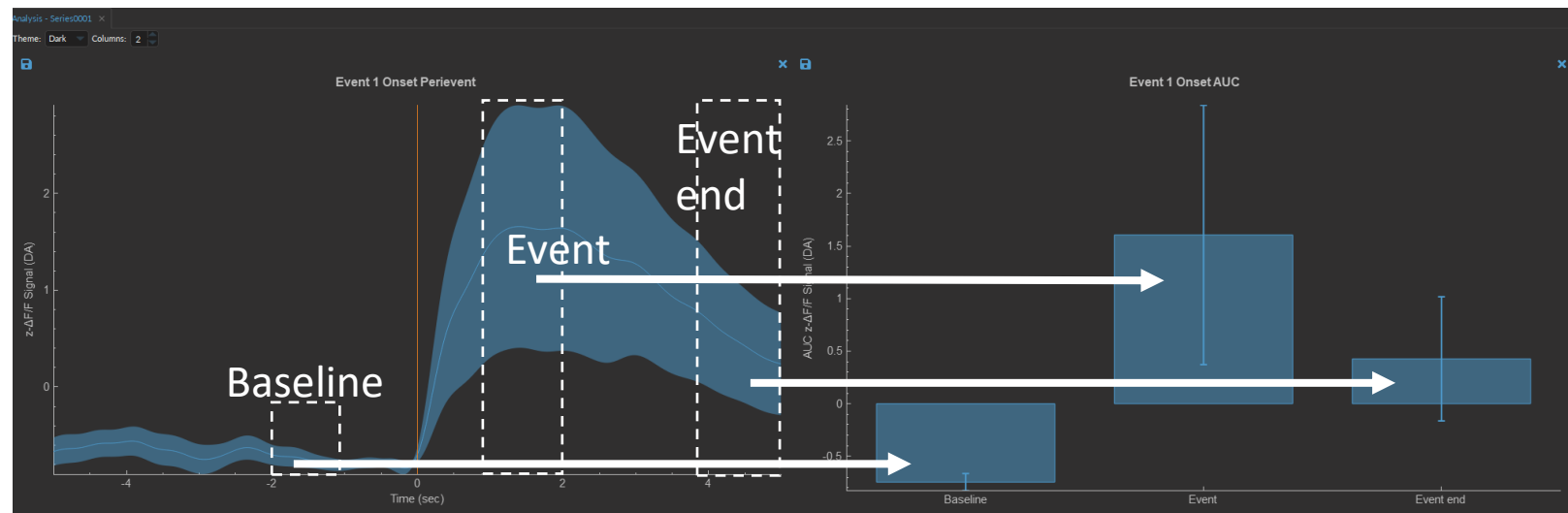
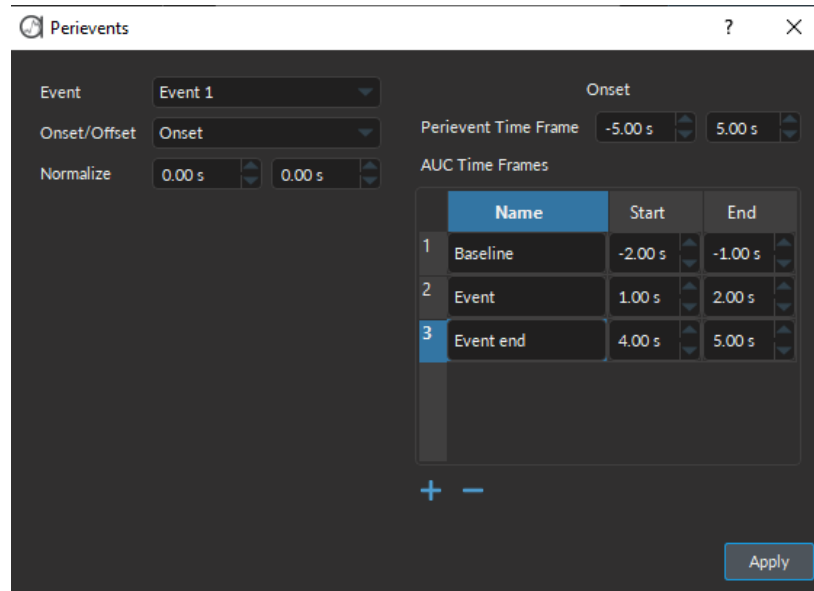
Calculate Peri-Event Histograms

Align multiple Events together

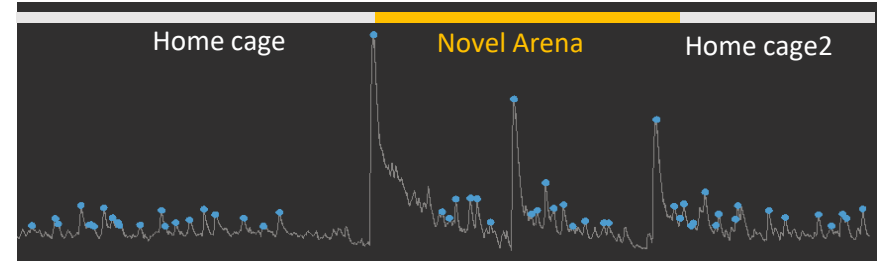


Same data, but seeing each independent neural response to the same type of event

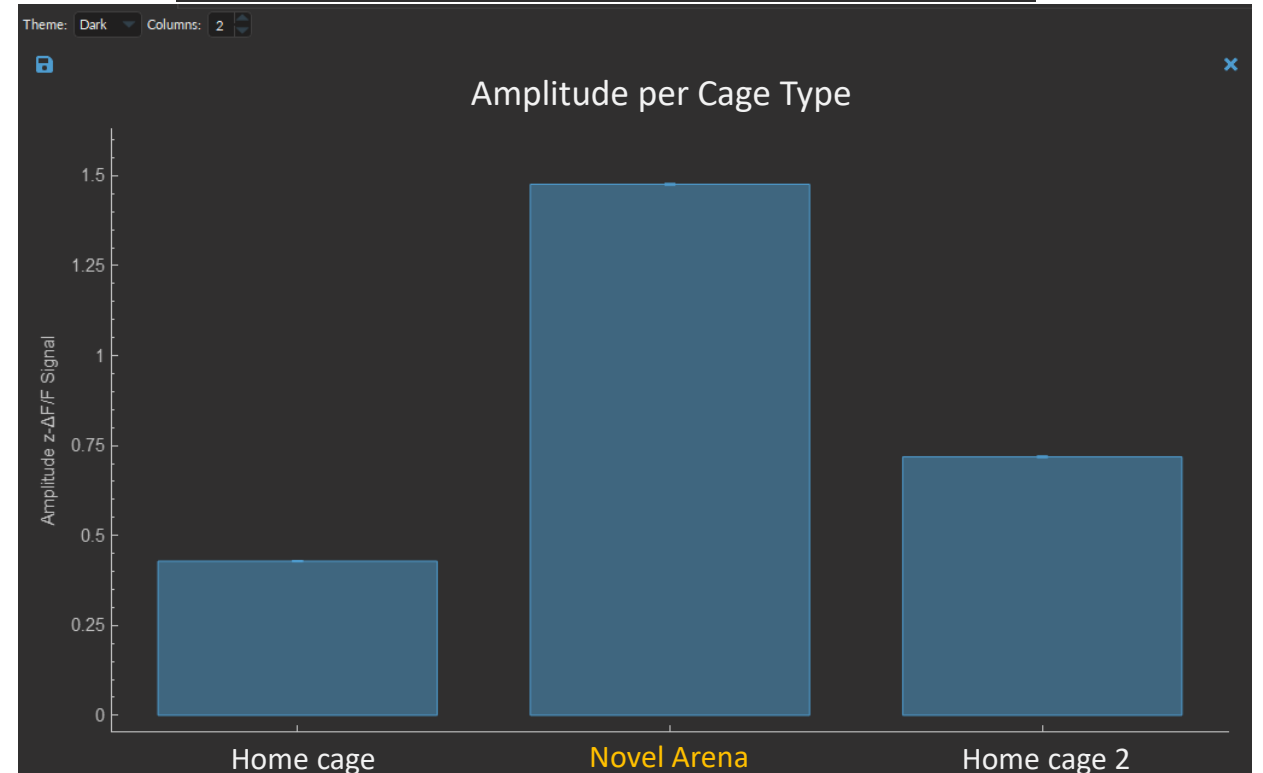
Calculate Area Under the Curve



Spike Statistics: Amplitude, Frequency & Count



The screenshot shows a software interface with two main panels. The left panel, titled 'Select Analysis and Data', has a dropdown menu for 'Analysis' set to 'Signal Statistic'. Below it, there are dropdown menus for 'Data' (DataProcessed), 'Driver' (Device1), 'Group' (Spikes), and 'Series' (Series0001). A 'Datasets' list contains 'DA'. An 'Analyze' button is at the bottom right of this panel. The right panel, titled 'Signal Statistic', has dropdown menus for 'Behavior Data Type' (Time Period), 'Time Period' (Cage Type), and 'Statistic' (Amplitude). A mouse cursor is hovering over the 'Amplitude' option in the 'Statistic' dropdown menu.



Experiment Analysis

Organise entire Experiments

	File	Animal	Sex	Group	Trial
1	F873G2GCampPCClst_0001.doric	873	F	CCIST	Trial1
2	F877G2GCampPCClst_0001.doric	877	F	CCIST	Trial1
3	F881G2GCampPCClst_0001.doric	881	F	CCIST	Trial1
4	F888G2GCampPCClst_0001.doric	888	F	CCIST	Trial1
5	F889G2GCampPCClst_0001.doric	889	F	CCIST	Trial1
6	M879G2GCampPCClst_0001.doric	879	M	CCIST	Trial1
7	M886G2GCampPCClst_0001.doric	886	M	CCIST	Trial1
8	M893G2GCampPCClst_0001.doric	893	M	CCIST	Trial1
9	M897G2GCampPCClst_0001.doric	897	M	CCIST	Trial1
10	M899G2GCampPCClst_0001.doric	899	M	CCIST	Trial1
11	M902G2GCampPCClst_0001.doric	902	M	CCIST	Trial1
12	/G2 Naive/F873GCampNaive_0001.doric	873	F	Naive	Trial1
13	/G2 Naive/F877GCampNaive_0001.doric	877	F	Naive	Trial1
14	/G2 Naive/F881GCampNaive_0001.doric	881	F	Naive	Trial1
15	/G2 Naive/F881GCampNaiverrep_0001.doric	881	F	Naive	Trial2
16	/G2 Naive/F888GCampNaive_0001.doric	Animal16	F	Naive	Trial1
17	/G2 Naive/F889GCampNaive_0001.doric	889	F	Naive	Trial1
18	/G2 Naive/M879G2GCampNaive_0001.doric	879	M	Naive	Trial1
19	/G2 Naive/M886GCampNaive_0001.doric	886	M	Naive	Trial1
20	/G2 Naive/M886GCampNaiverrep_0001.doric	886	M	Naive	Trial2
21	/G2 Naive/M893GCampNaive_0001.doric	889	M	Naive	Trial1
22	/G2 Naive/M893GCampNaiverrep_0001.doric	893	M	Naive	Trial1
23	/G2 Naive/M897G2GCampNaive_0001.doric	972	M	Naive	Trial1
24	/G2 Naive/M899G2GCampNaive_0001.doric	899	M	Naive	Trial1
25	/G2 Naive/M899G2GCampNaiverrep_0001.doric	889	M	Naive	Trial3
26	/G2 Naive/M899GCampNaiverrep_0001.doric	889	M	Naive	Trial2
27	/G2 Naive/M902G2GCampNaive_0001.doric	902	M	Naive	Trial1
28	/G2 Naive/M902GCampNaiverrep_0001.doric	902	M	Naive	Trial2

Automatically generate Experimental designed

Individual recording
Data files

Input animal/categories/groups/trials etc. assigned to each recording

Batch Processing entire Experiments

The screenshot displays the 'Create Pipeline' window with the following components:

- Files:** A list of 24 data files (e.g., G2_Naive/F873GCamPNaive_0001.doric) highlighted with a red box.
- Processing Pipeline:** A central area with a search bar containing 'Photometry deltaF/F' and a list of available operations including 'Align Signals', 'Arithmetics', 'Remove Baseline (arPLS)', 'Remove LED Artifacts', 'Decimate', 'Signals deltaF/F', 'Filter', 'Find Spikes', 'Remove Artifacts', 'Perievents', and 'Interpolate'.
- Parameters:** A section for 'dF/F Parameters' with sub-sections: 'Signal' (Calcium Independent: LockInAOUT1, Calcium Dependent: LockInAOUT2), '1. Discard Signal Onset and Offset' (Onset/Offset: 0.000 sec), '2. Smooth Signal' (Algorithm: None), '3. Correct Baseline' (Lambda: 10), and '4. Fit Signals' (Maximum Threshold: 1.00).
- Processing Example View:** Three vertically stacked plots showing 'Calcium Independent Signal', 'Calcium Dependent Signal', and 'dF/F Signal' over time (0.00:05:00.000 to 0.00:15:00.000). A 'Fit line between calcium dependent and independent signals' plot is shown at the bottom.

Individual Data files

Set and test parameters On each animal recording

Pick several processing/analysis operation to apply to all data files

Analyze Data over different Groups

Merge groups together

The screenshot shows a software interface for selecting groups and analysis parameters. It is divided into two main sections: 'Select Groups' and 'Select Analysis'.

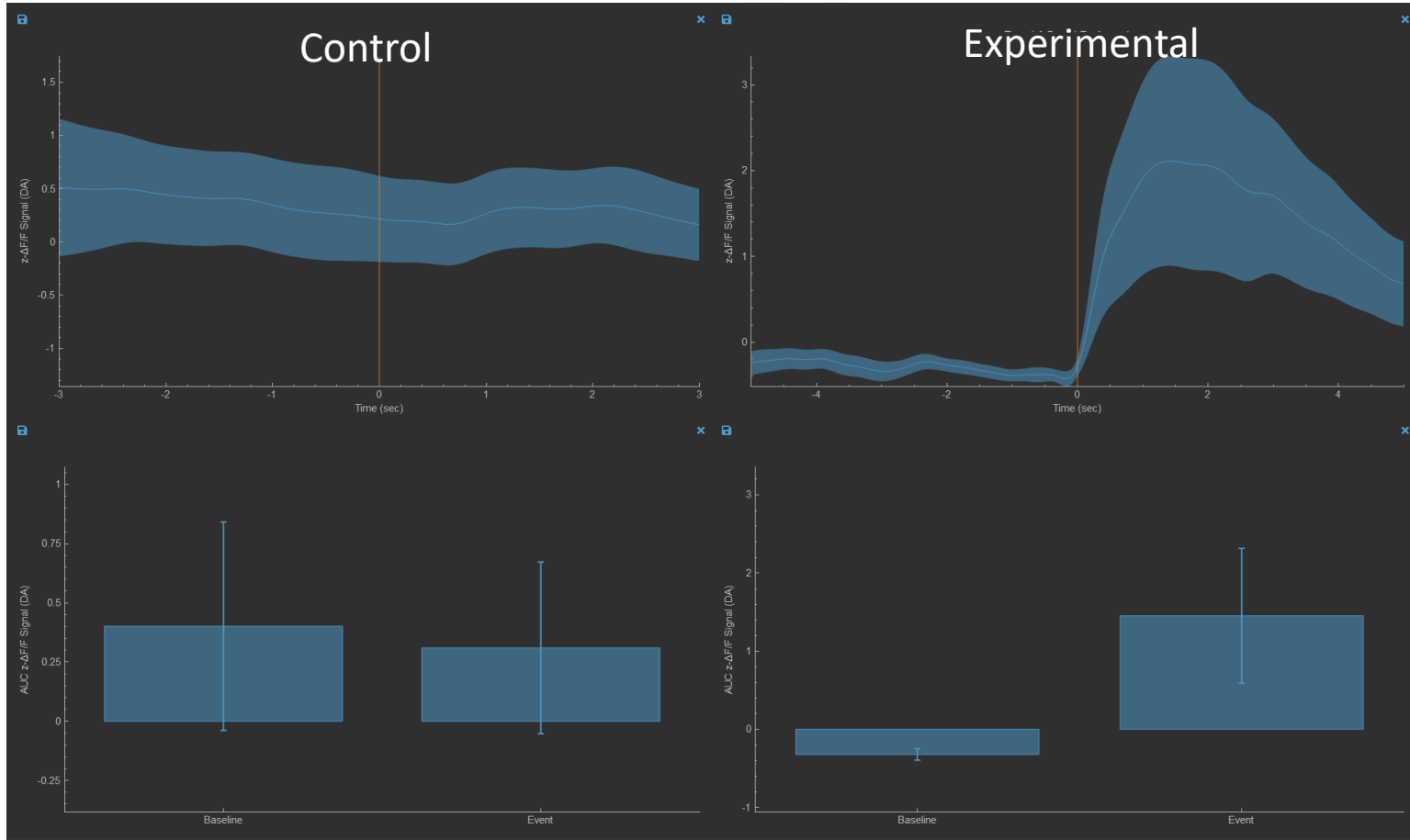
Select Groups: This section has three columns: 'Group', 'Treatment', and 'Animal'. Each column has a 'Merge' checkbox and a 'Select All' checkbox. The 'Group' column contains 'CONT' and 'IPSI'. The 'Treatment' column contains 'F' and 'M'. The 'Animal' column contains '376', '377', '378', '398', and '400'. Annotations include an arrow pointing to the 'Merge' checkbox in the 'Treatment' column with the text 'Merge groups together', and an arrow pointing to the 'Animal' list with the text 'Pick animals to include in analysis'. A note at the bottom right of this section says '*Select at least one sample per each category'.

Select Analysis: This section shows a file path '231013_V_376_0_16_CONT_0000.doric'. The 'Analysis' dropdown is set to 'FootShockPerievents' and the 'Process' dropdown is set to 'DFFSignals'. There are two tables of parameters and values. The first table is for 'Perievents' and the second is for 'Photometry deltaF/F'. Annotations include an arrow pointing to the 'Analysis' dropdown with the text 'Pick analysis operation (like Perievent)', and an arrow pointing to the 'Photometry deltaF/F' table with the text 'Check which parameters were applied in past processed signal'. At the bottom, there is an 'Ignore Process Parameters' checkbox and a note '*Make sure that the selected recordings contain processed and analyzed data with the parameters above'. An 'Analyze' button is located at the bottom right.

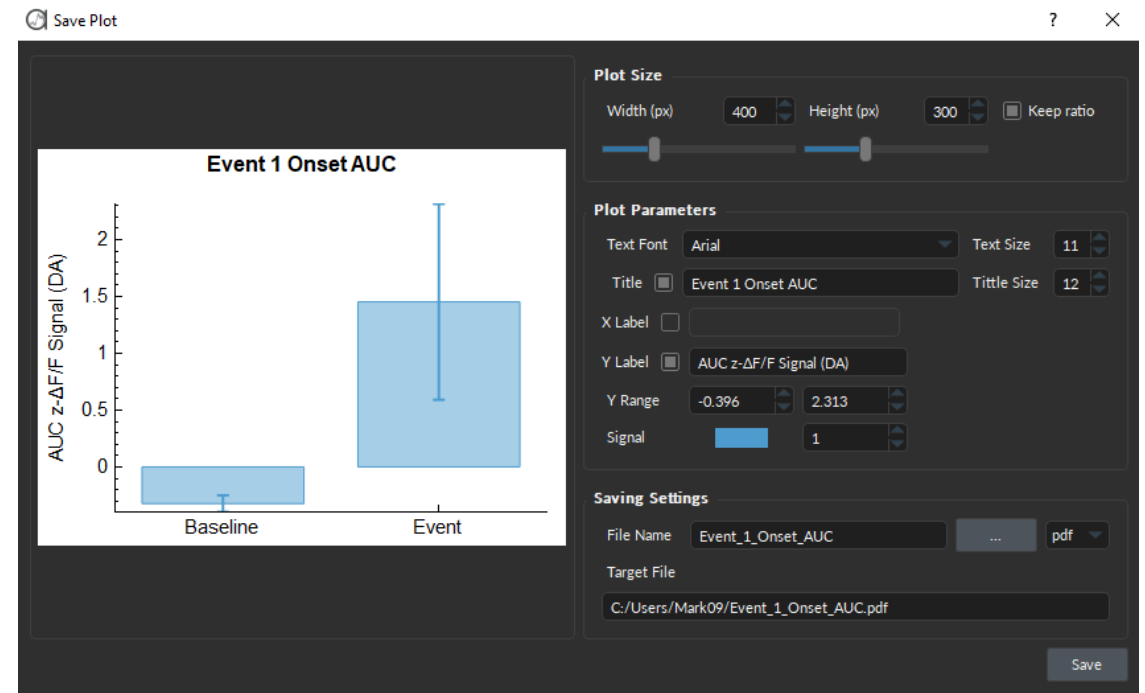
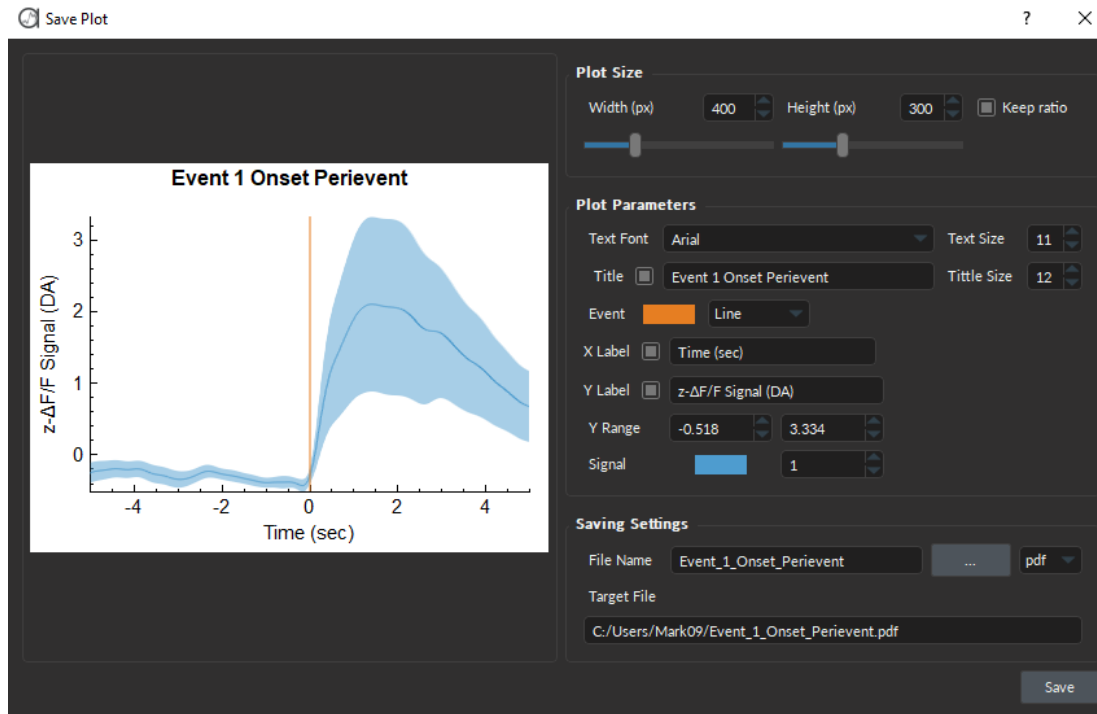
Parameter	Value
Event	FootShock
EventPath	/DataBehavior/Events/Series0001/FootShock
OnsetAUCNames	Baseline, Event
OnsetAUCWindows	-5, 0; 0, 5
OnsetWindow	-5, 5

Parameter	Value
ButterworthLowpassFrequency(Hz)	2
DiscardFromBeginning(sec)	30
DiscardFromEnd(sec)	-1
InterpolationType	Linear
ReferenceName	AIN02xAOUT01-LockIn
ResidualThreshold	1
SmoothAlgorithm	Low-pass Butterworth Filter
arPLSLambda	13

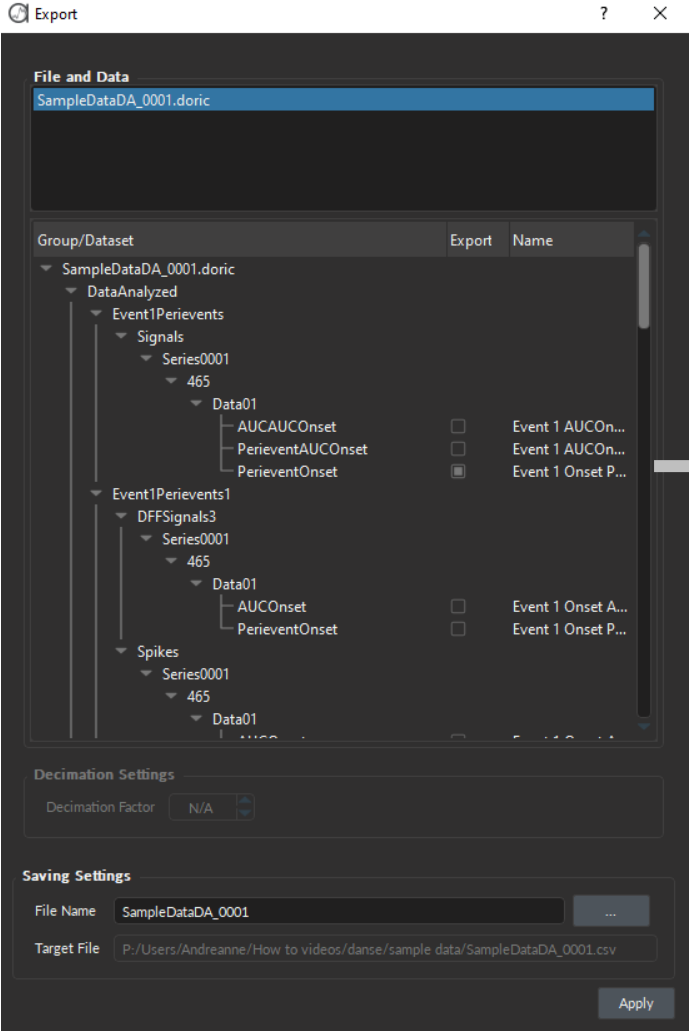
Analyze Data over different Groups



Export Figures



Export data in .csv files



OR

	A	B	C	D	E	
1	m124	-0.37992	-0.37983	-0.37983	-0.37993	-C
2	m125	-0.43154	-0.43225	-0.43308	-0.434	-C
3	m127	-0.31806	-0.31399	-0.30977	-0.30545	-C
4	m128	-0.40268	-0.40482	-0.40688	-0.40887	-C
5	m129	0.130575	0.139805	0.149257	0.158907	0.
6	m130	-0.26732	-0.26867	-0.26994	-0.27111	-C
7	m131	-0.24904	-0.2495	-0.24985	-0.25007	-C
8	m134	-0.00632	-0.00026	0.005496	0.010937	0.
9	m135	-0.4622	-0.46424	-0.46669	-0.46954	-C
10	m136	2.87814	2.8748	2.8717	2.86886	
11	m139	1.71099	1.70848	1.70582	1.703	1
12	m140	1.81811	1.81289	1.80744	1.80178	1
13	m141	-0.1402	-0.13805	-0.13592	-0.13383	-C
14	m143	-0.18151	-0.10486	-0.02543	0.05662	0.
15						
16						

	Baseline	Event
0	0	0
1	0	0
2	353	93
3	353	93
4	-820	653
5	-882	681
6	0	0
7	-823	653
8	1	0

Copy data directly from File Editor

Resources

Tutorial Videos

neuro.doriclenses.com/pages/video

How-to:
Link Behavior Video in danse™

How-to:
Load and visualize data in danse™

How-to:
Use photometry $\Delta F/F$ in danse™

How-to:
Use the Create Pipeline Tool in danse™

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