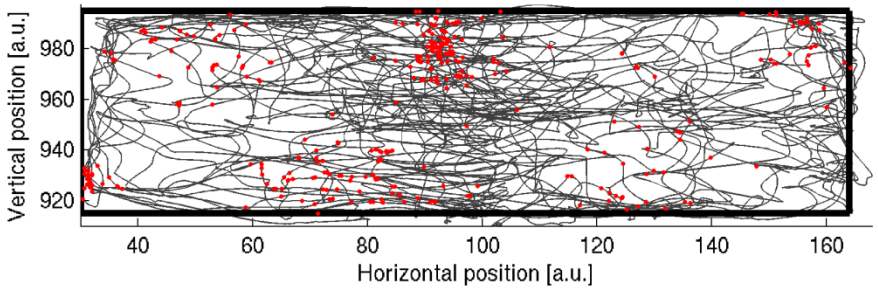
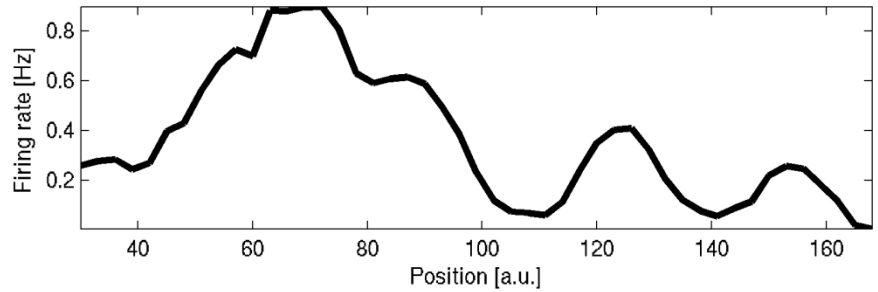
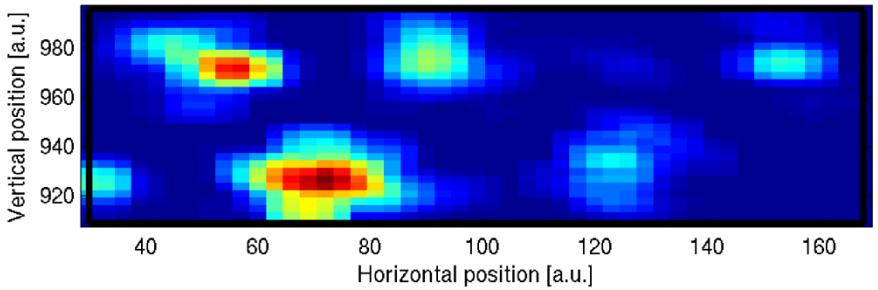


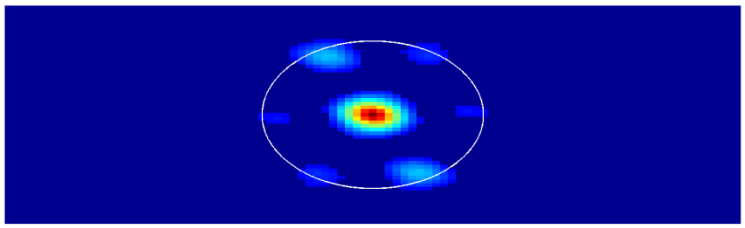
Trajectories in 2D space and spikes (red)



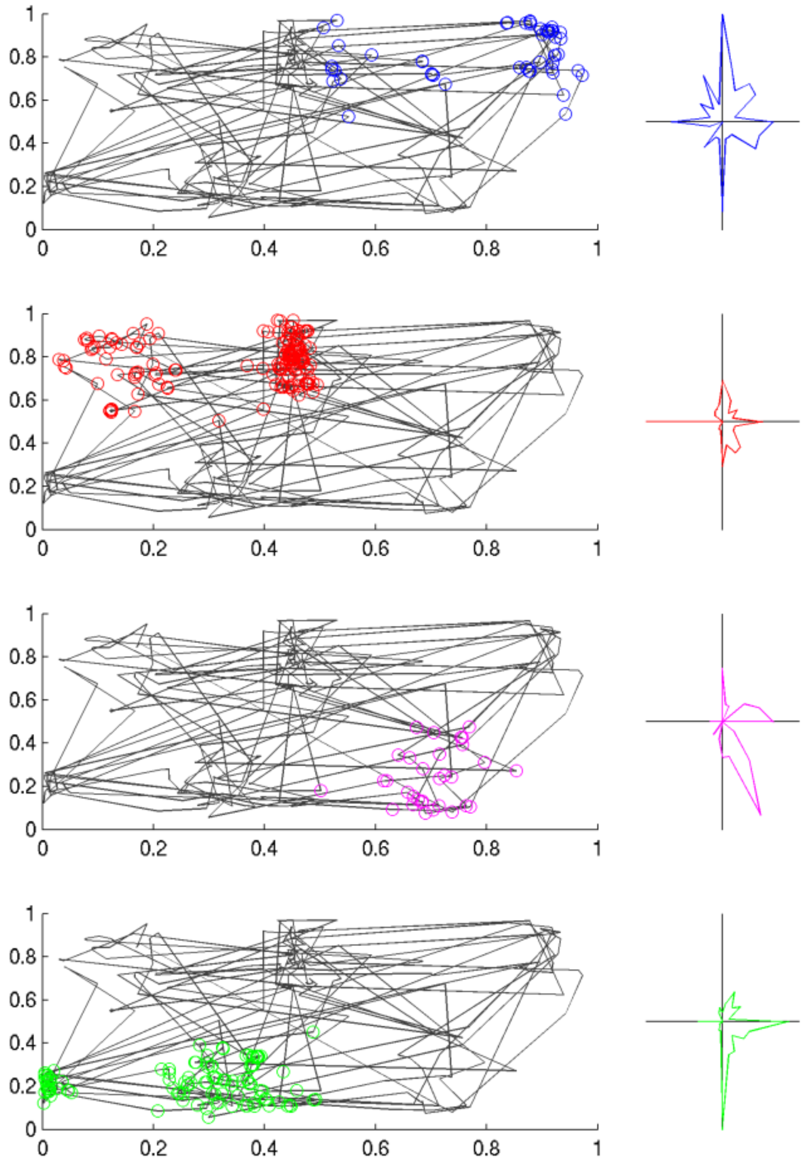
Firing rate as a function of position along X-axis



2D firing field map: spike rate as a function of space in x and y coordinates. Strongest response in lower left quadrant.



2D spatial autocorrelation showing 6 peaks at regular intervals (60º suggesting grid cell response properties)

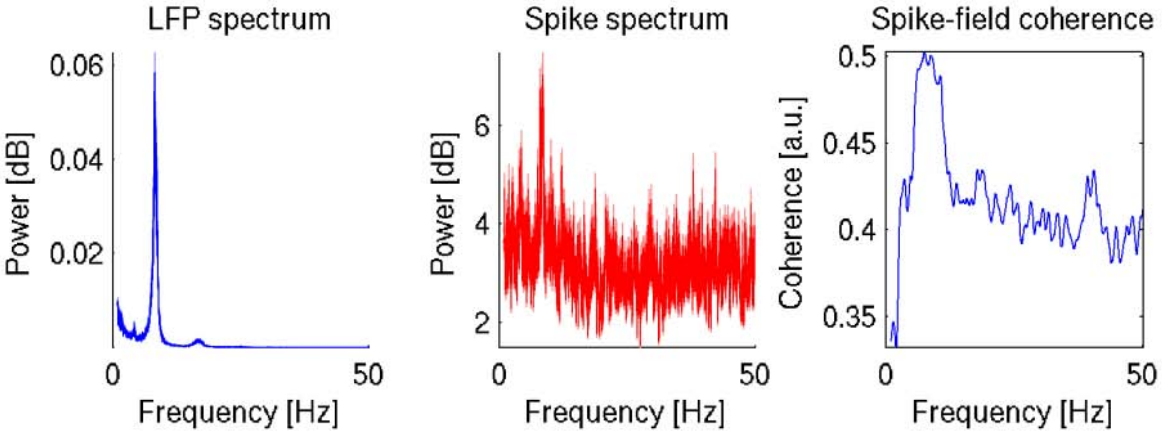


Spatial tuning of neuron as a function of position in field and bearing for upper right (blue), upper left (red), lower right (purple) and lower Left(green).

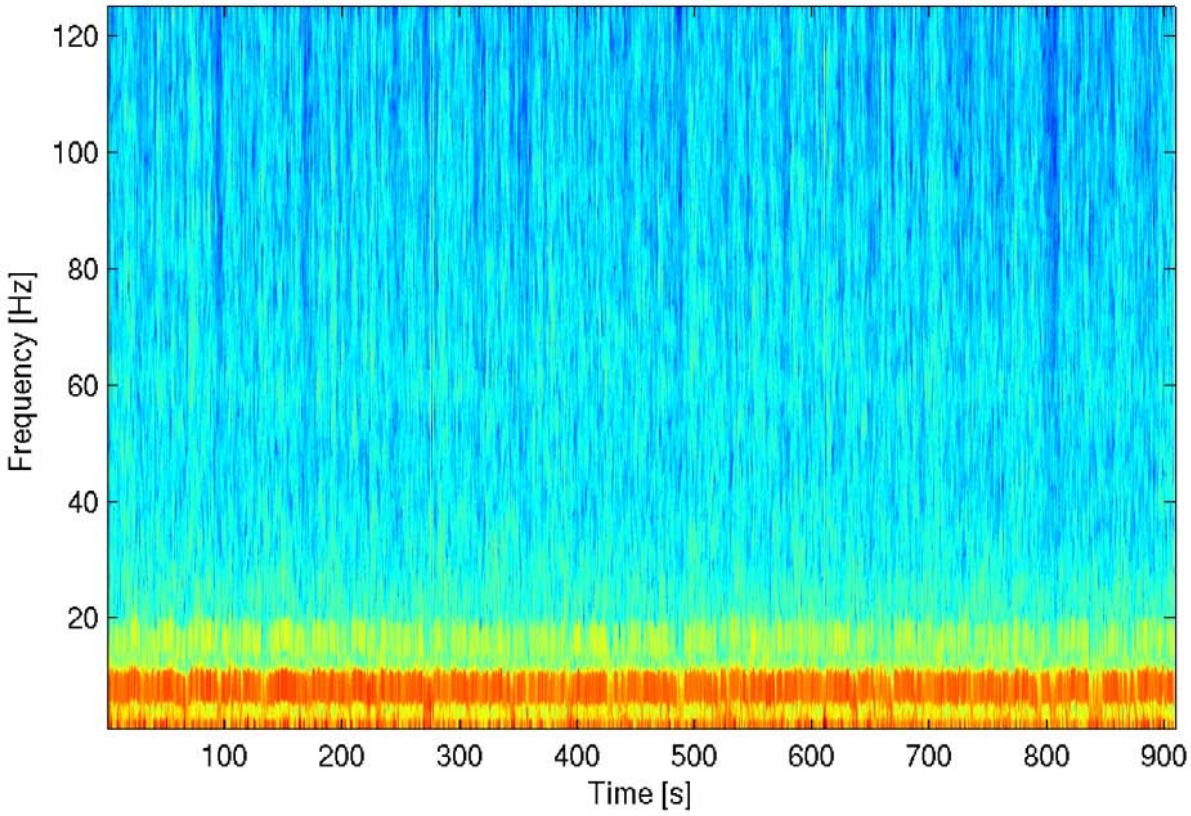
North was referenced as coordinate X = (0.5,1)

Tuning plots show north at 90º (along positive X-axis).

Maximal tuning for bearing at N and E.

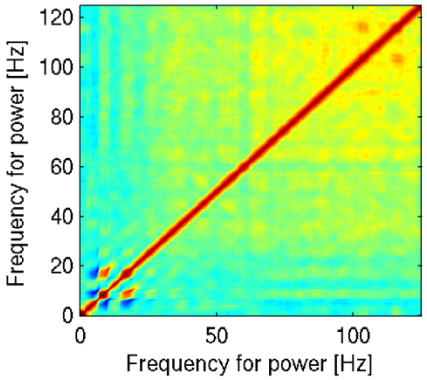


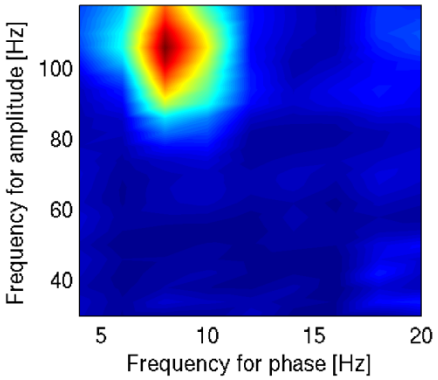
Spectral analysis of LFP and spike train data.



Strong theta power
In both the LFP and
Spike spectrum.
Spike field coherence
Shows peak at theta
Frequencies as well.

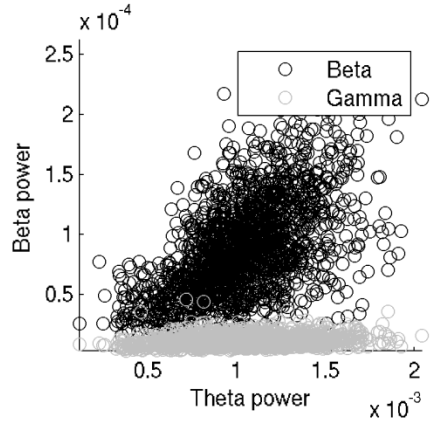
Note enhanced beta
Power in spectrogram
At harmonic frequencies
Of theta peak.

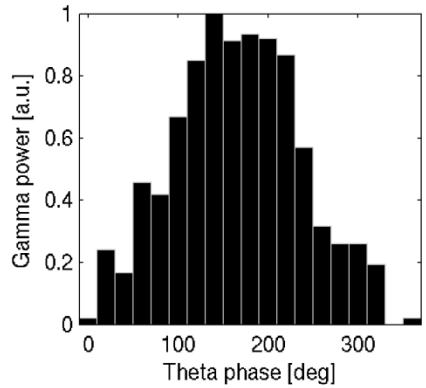




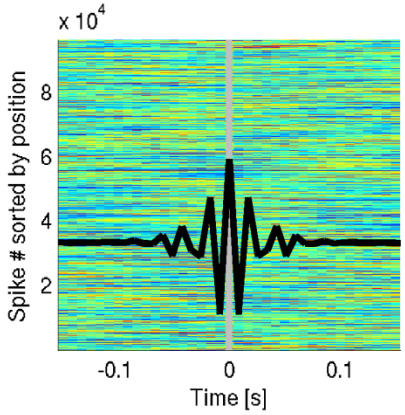
Putative cross-frequency coupling

Power to power (left) and phase amplitude Coupling (left). Note putative coupling between theta phase and gamma power.

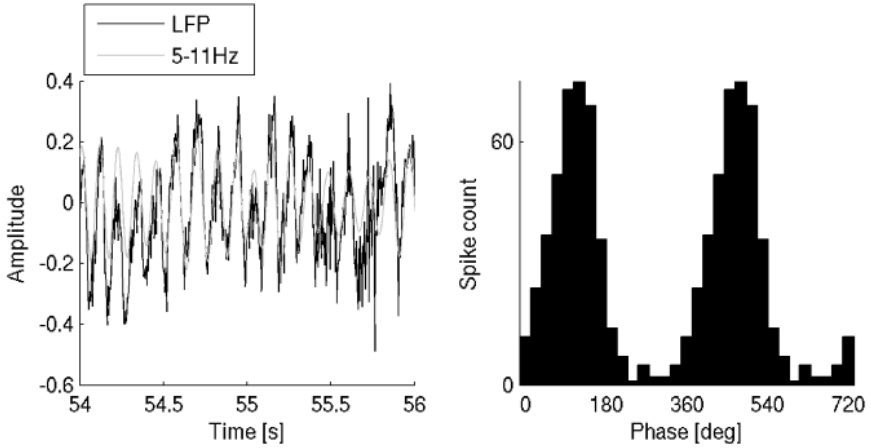




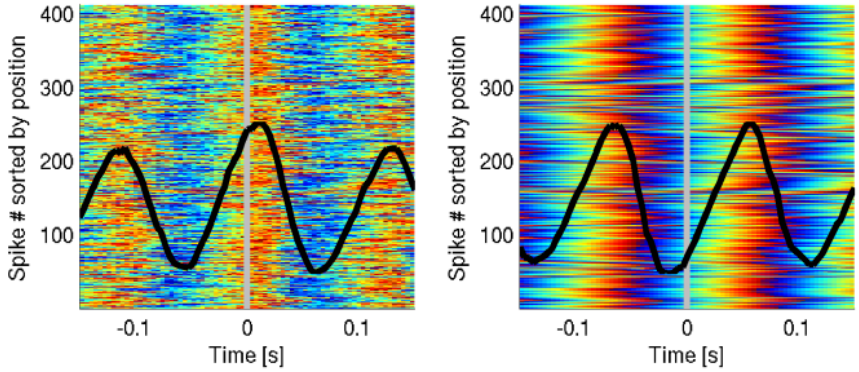
Power to power correlation (left) and Phase amplitude histogram (right).



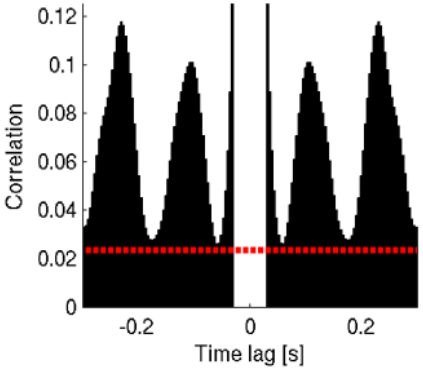
Gamma peak-triggered LFP potential. Note absence of theta oscillation. Duration of gamma burst ~0.1 s which Agrees with period of theta cycle.



Spiking activity is modulated by theta phase (all spikes)

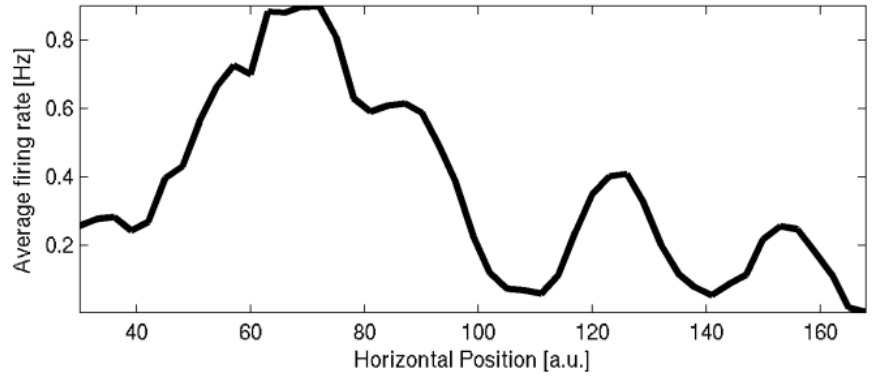


Spike triggered average LFP amplitude (left) and phase (right) showing strong locking Of spiking activity to theta phase.

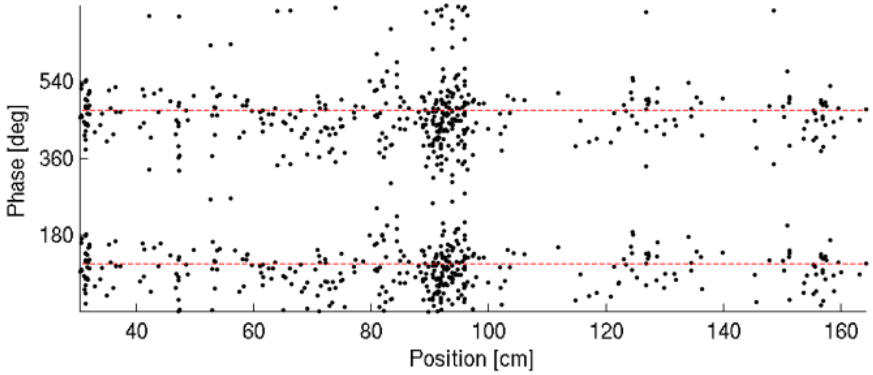


Autocorrelation of spike train shows periodic modulation at ~0.1 s (10Hz) corresponding to theta phase.

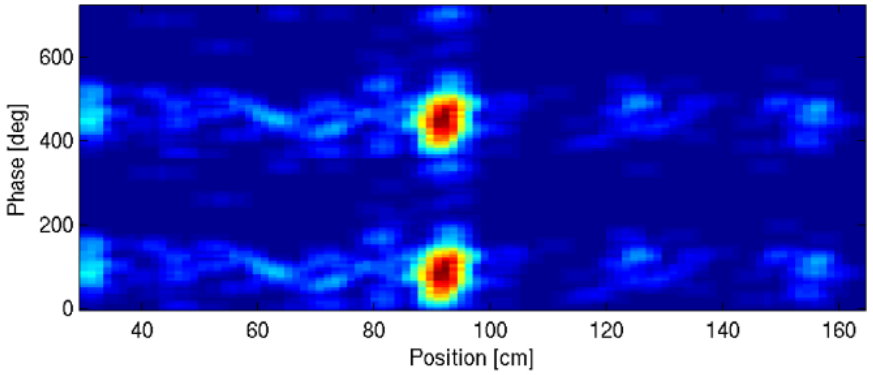
Correlation between spike time, Theta phase and spatial position.



Average firing rate as a function of position Along x-axis.

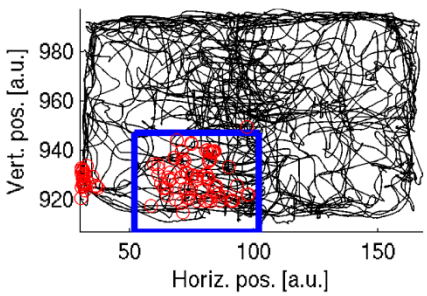


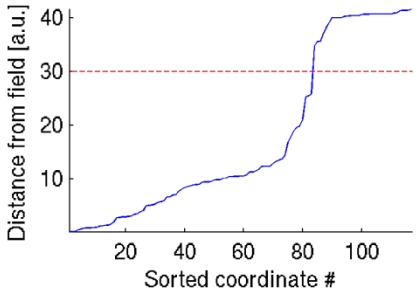
Theta phase as a function of position along X-axis.

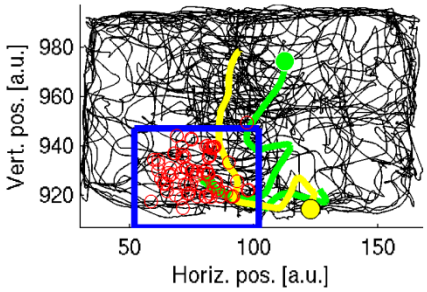


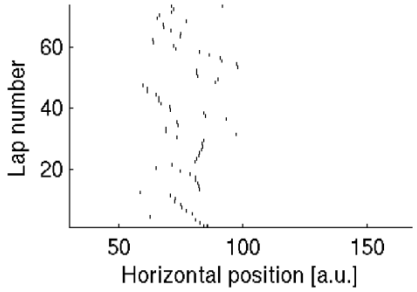
2D correlation between spike time, theta Phase and spatial position. Note peak In lower left quadrant.

Theta phase precession analysis for Firing field lower left quadrant

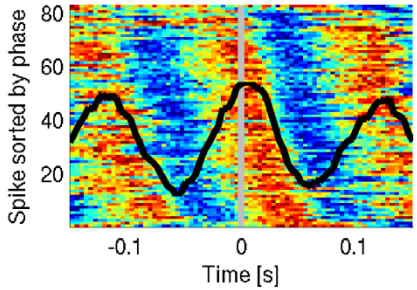


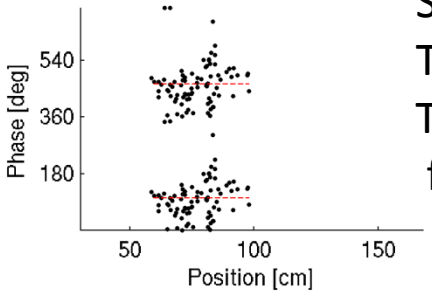




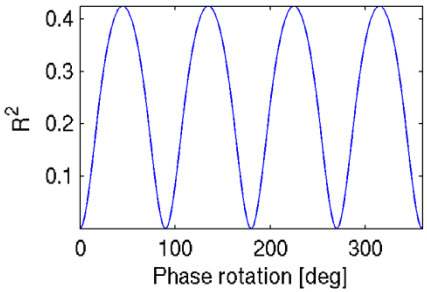


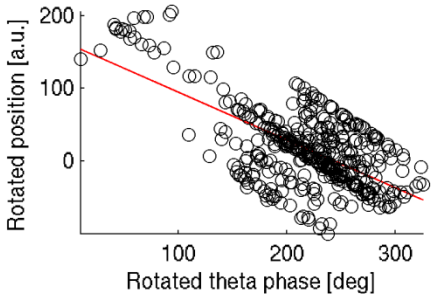
Laps through firing field (2 examples shown In green and yellow). Raster plot as a function Of position and laps through firing field (left).





Spike triggered LFP potential for spikes during laps Through firing field sorted by phase (right). Theta firing phase as a function of position in firing field (left).





Variance in position explained by theta phase (left) As a function of phase rotation (left). Theta phase Precession (right).