

UNIVERSITÀ
DEGLI STUDI
DI PADOVA

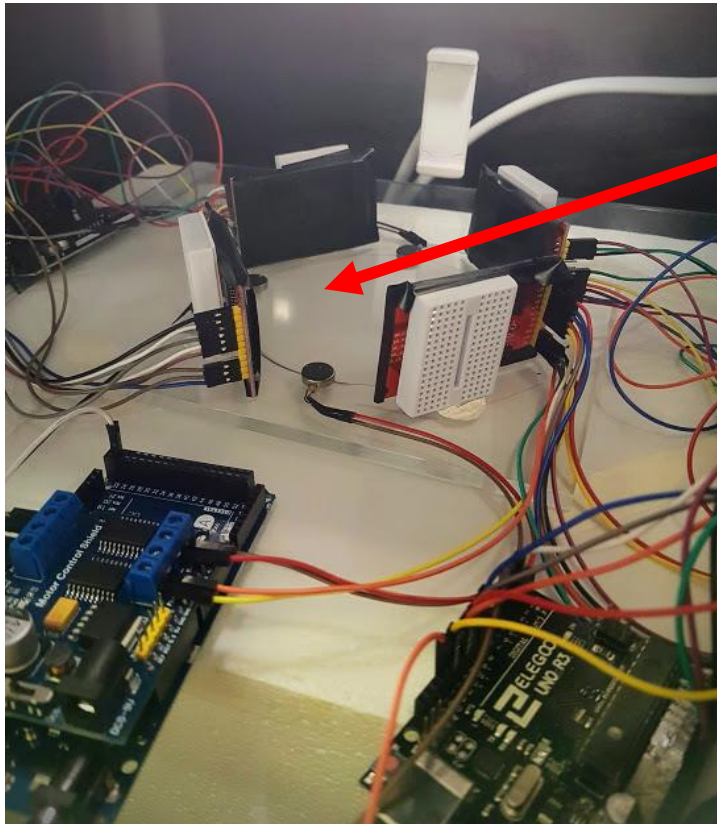
Study of locomotion and visual spatial learning in *Drosophila Melanogaster*

Neurogenetics and behavioural analysis laboratory
Pr Mauro A. Zordan – University of Padua, Italy

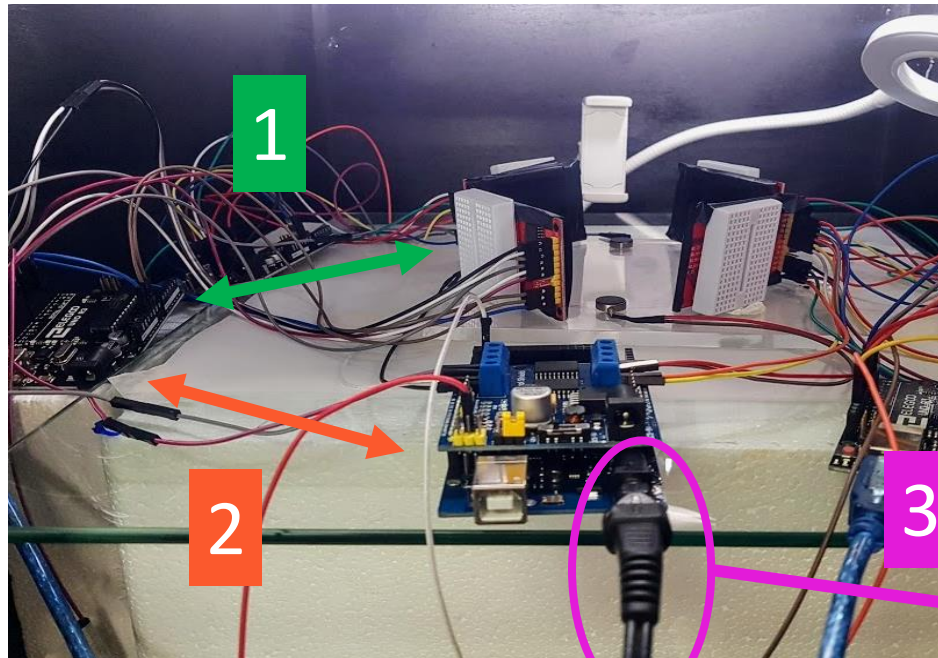
VICTOIRE MONTECALVO – L3MEG INTERNSHIP (2019) – ROMA DECEMBER 2020

Experiments

Do drosophila have the ability to visually learn places?



Wild type
X10/experience



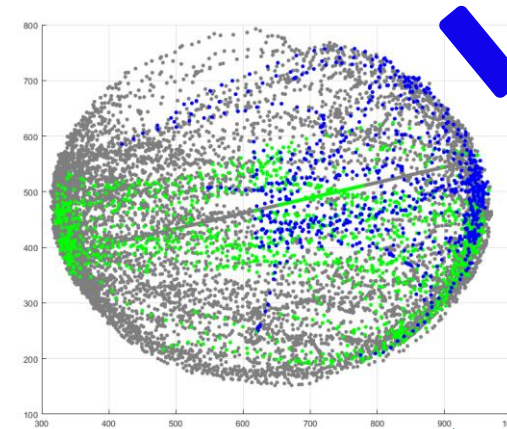
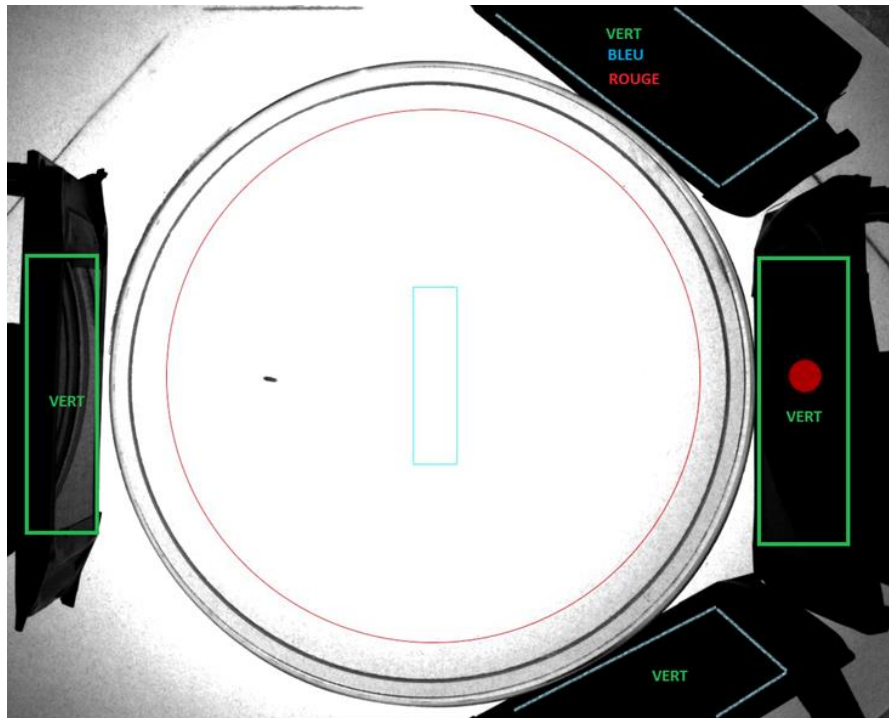
1. Screens
↑
Arduino Uno
2. Arduino Mega
↑
Software (Matlab)

Matlab 

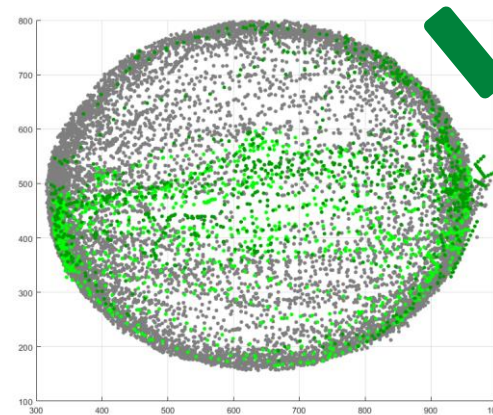
Colour perception test

Do drosophila perceive RGB colors?

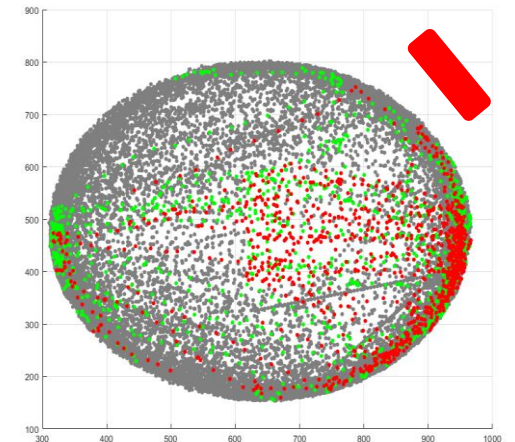
- Distraction effect



Blue ✓

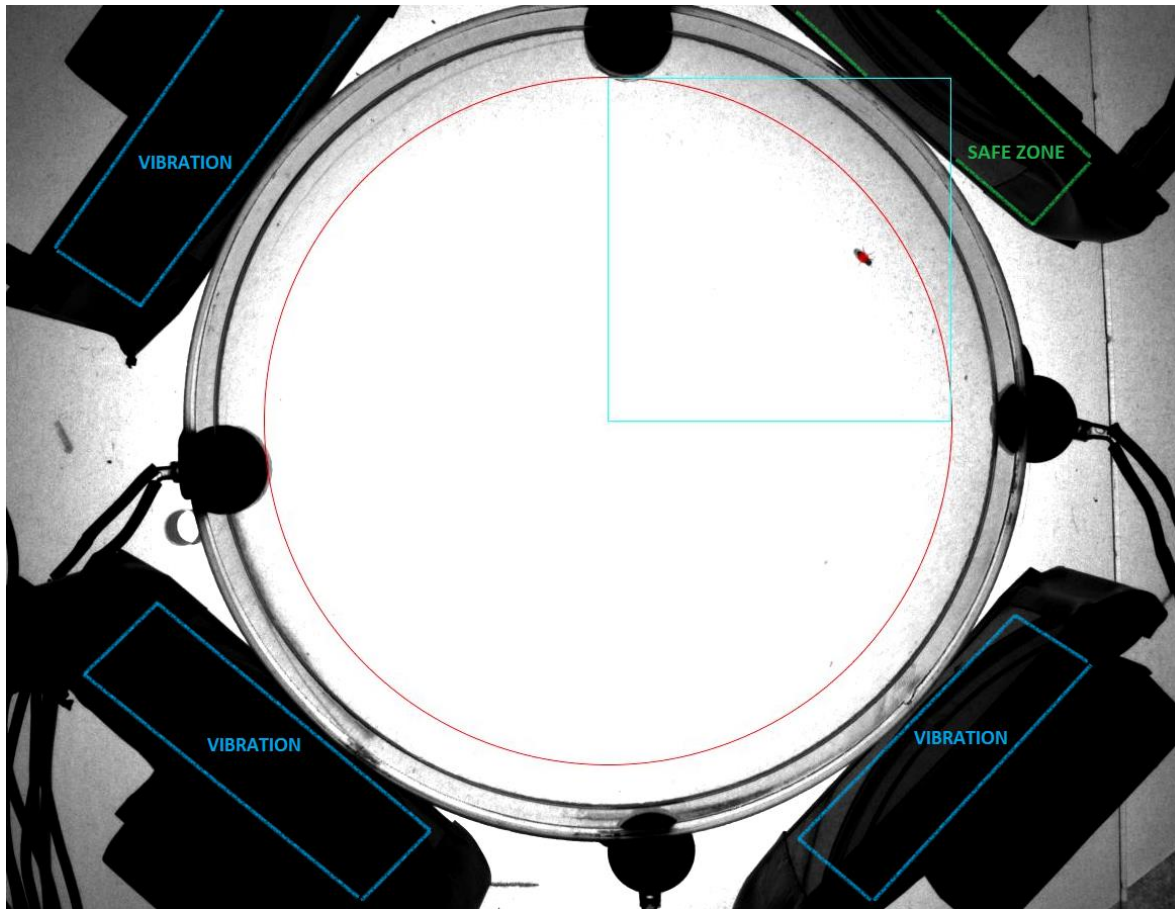


Green ✓



Red ✗

Learning and memory test



1. Learning

- *safe zone* // green
- 4500 frames (10min, 8fr/scd)

2. Complete darkness

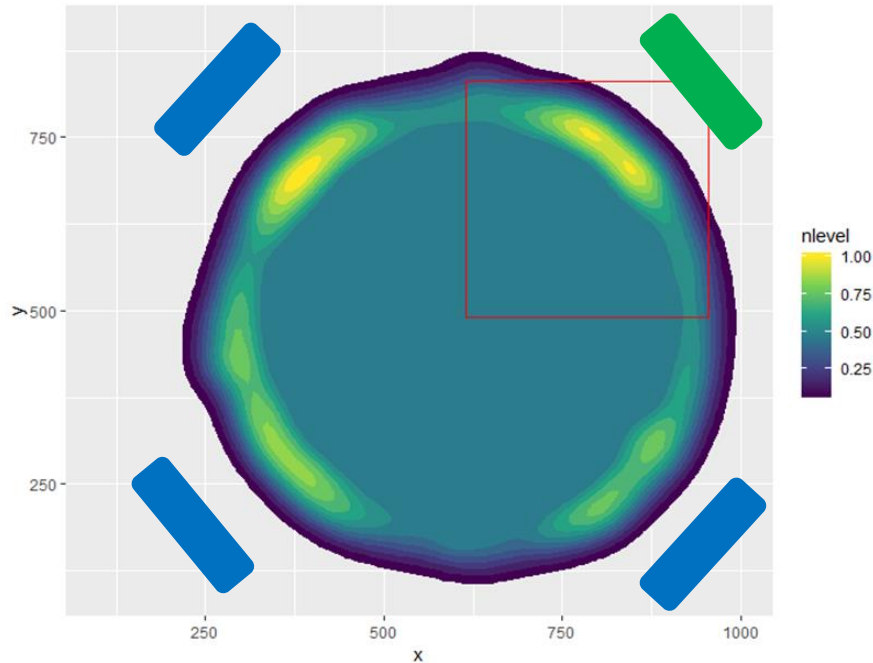
- screens/vibrations off
- during 5min

3. Memorization

- *safe zone* deletion
- continuous vibrations

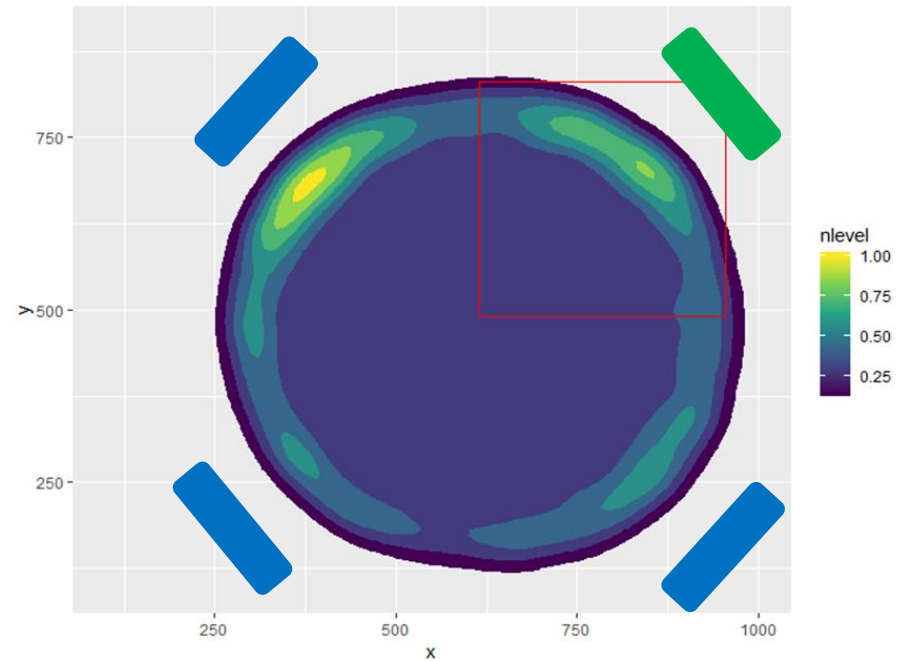
Learning and memory test

Learning : *safe zone*



Exploration behavior with the impression of going back & forth

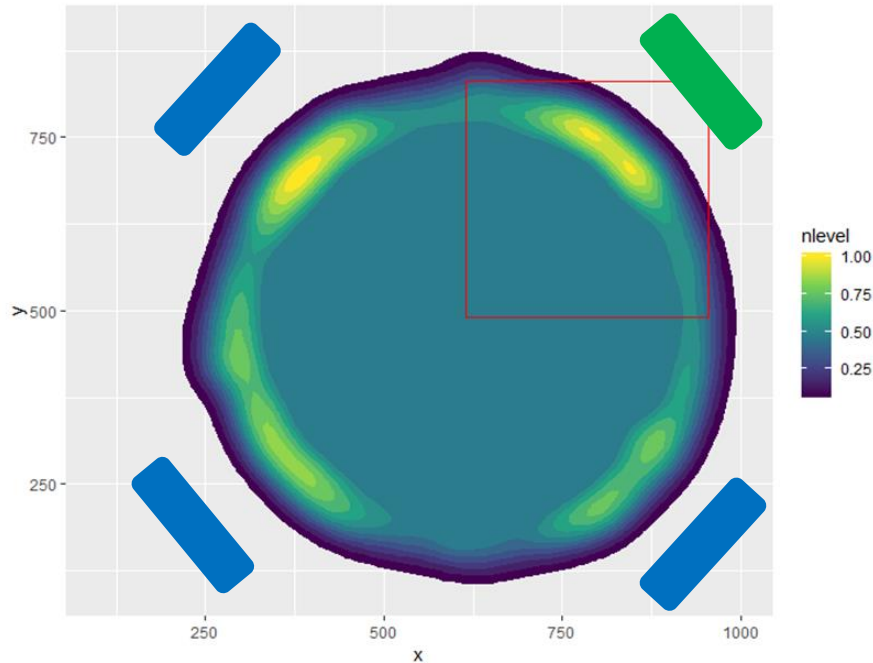
Memorization : no *safe zone*



Looking for the *safe zone*, more localized at the top of the arena

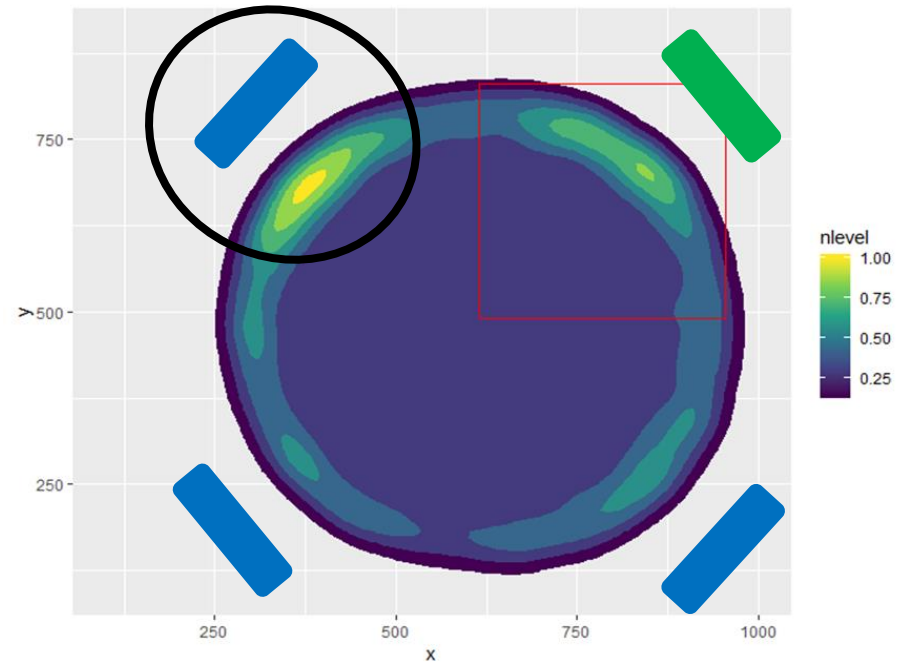
Learning and memory test

Learning : *safe zone*



Exploration behavior with the impression of going back & forth

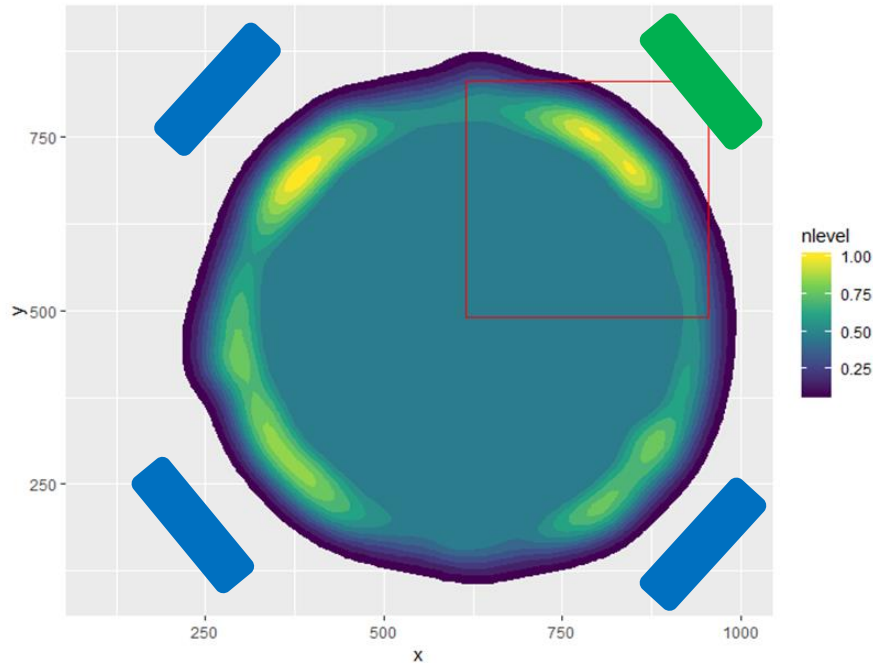
Memorization : no *safe zone*



Looking for the *safe zone*, more localized at the top of the arena

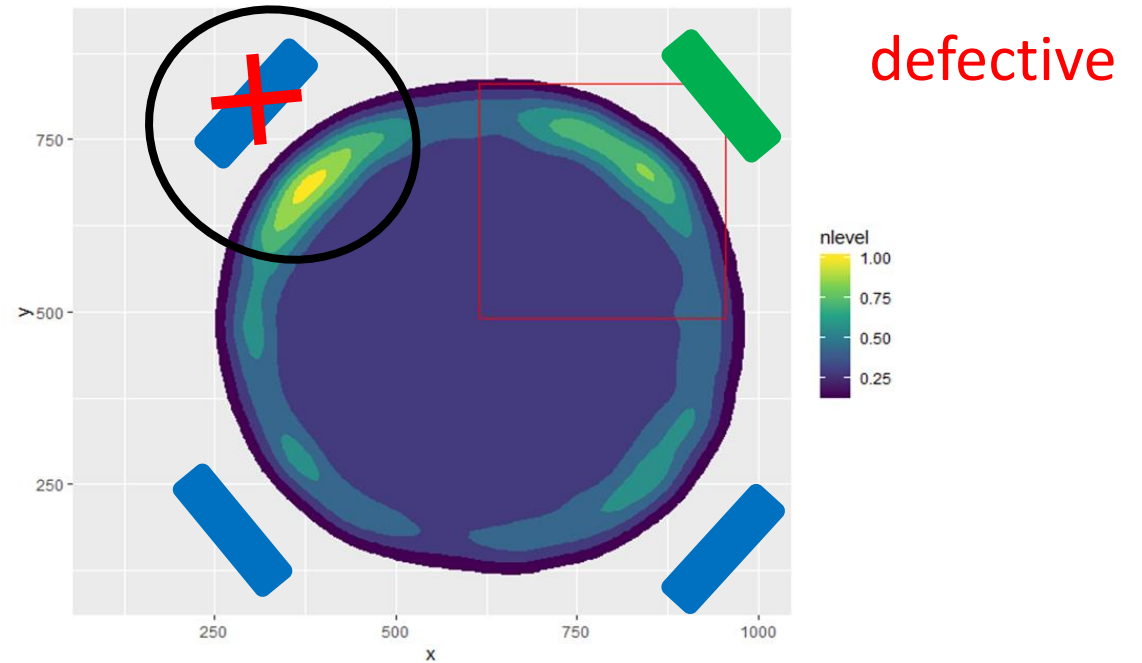
Learning and memory test

Learning : *safe zone*



Exploration behavior with the impression of going back & forth

Memorization : no *safe zone*



Looking for the *safe zone*, more localized at the top of the arena

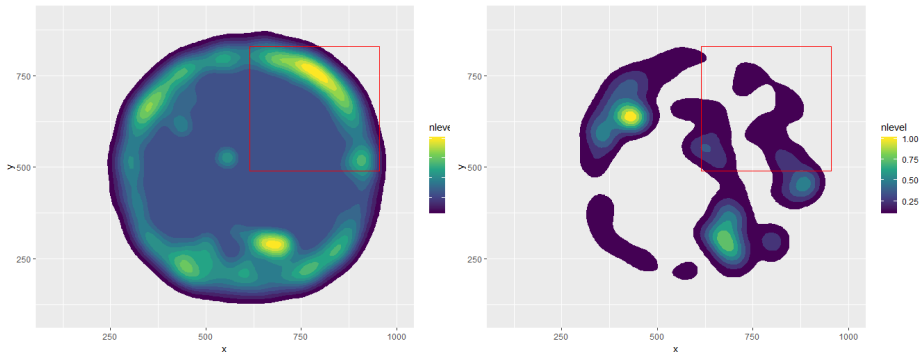
Discussion



Behaviour: ✓ Safe zone : explore a lot the arena
✗ Safe zone : do not remain static but try to find it
(moving in front of the screens)

Difficult to conclude on visual learning ability:

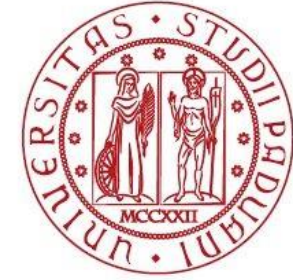
- Attraction for light stronger than the effect of vibration
- Vibration is not a strong enough stimulus
→ Change the defective screen, increase the vibration / test with another stimulus



Safe zone

No vibrations

- Vibrations: definitely do enhance locomotor activity
→ An effective stimulus to induce locomotion in the study of the locomotor capacity of fly models of neuromuscular disease



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Thank you for your attention

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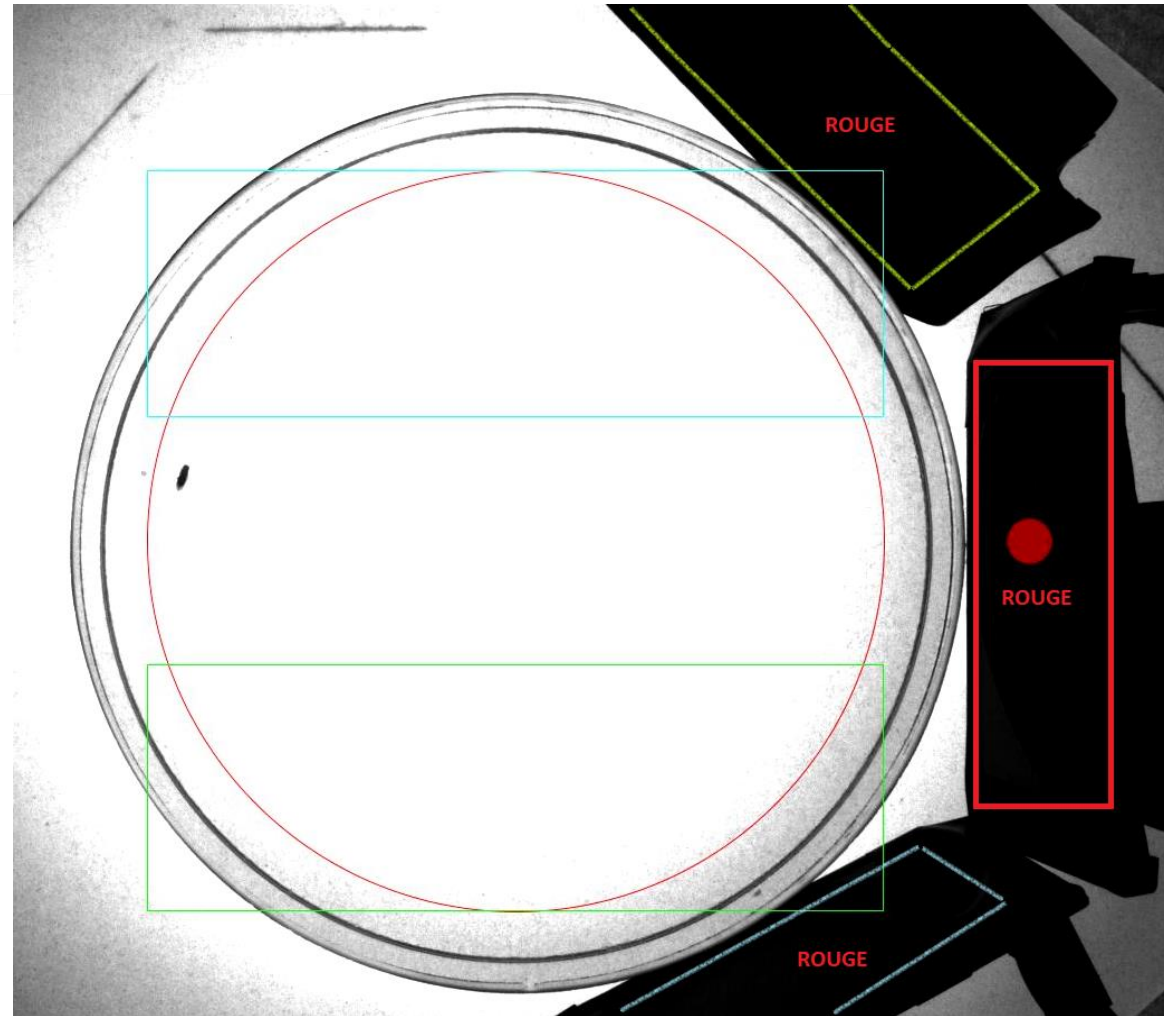
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Annex

Test red LED

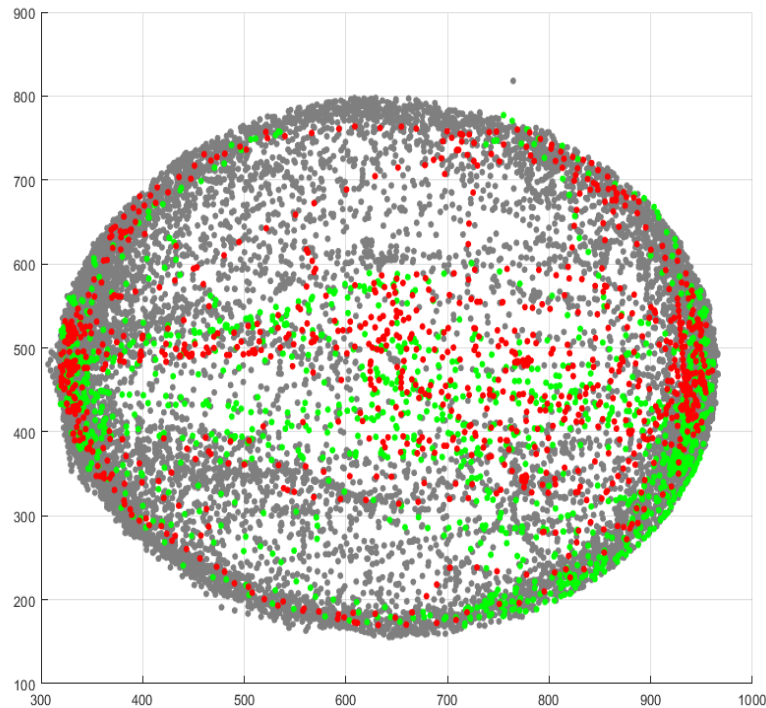
Non-light correlated behaviour

Does not seem to see the red LEDs



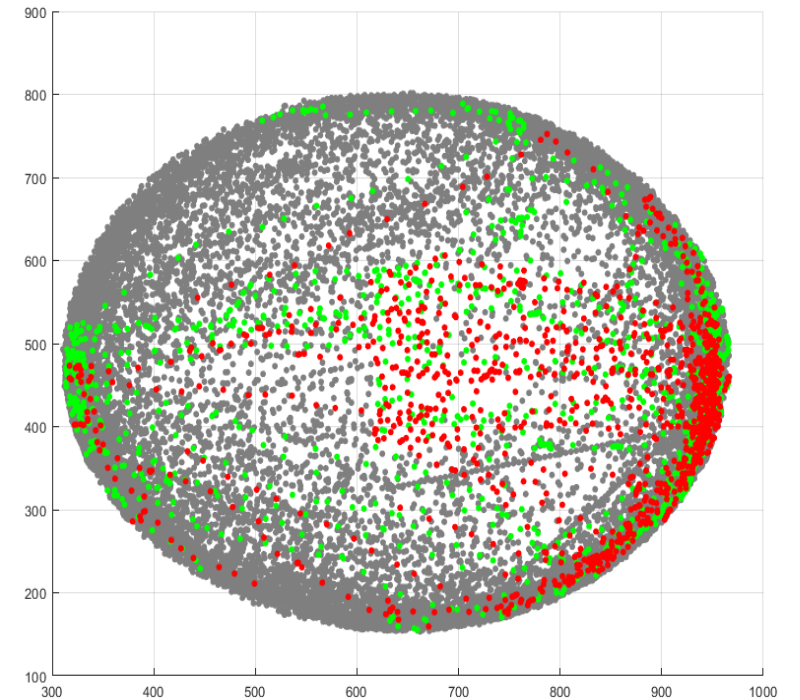
Annex

Red with backlight



Confirms that they are
not attracted to red but
to backlight

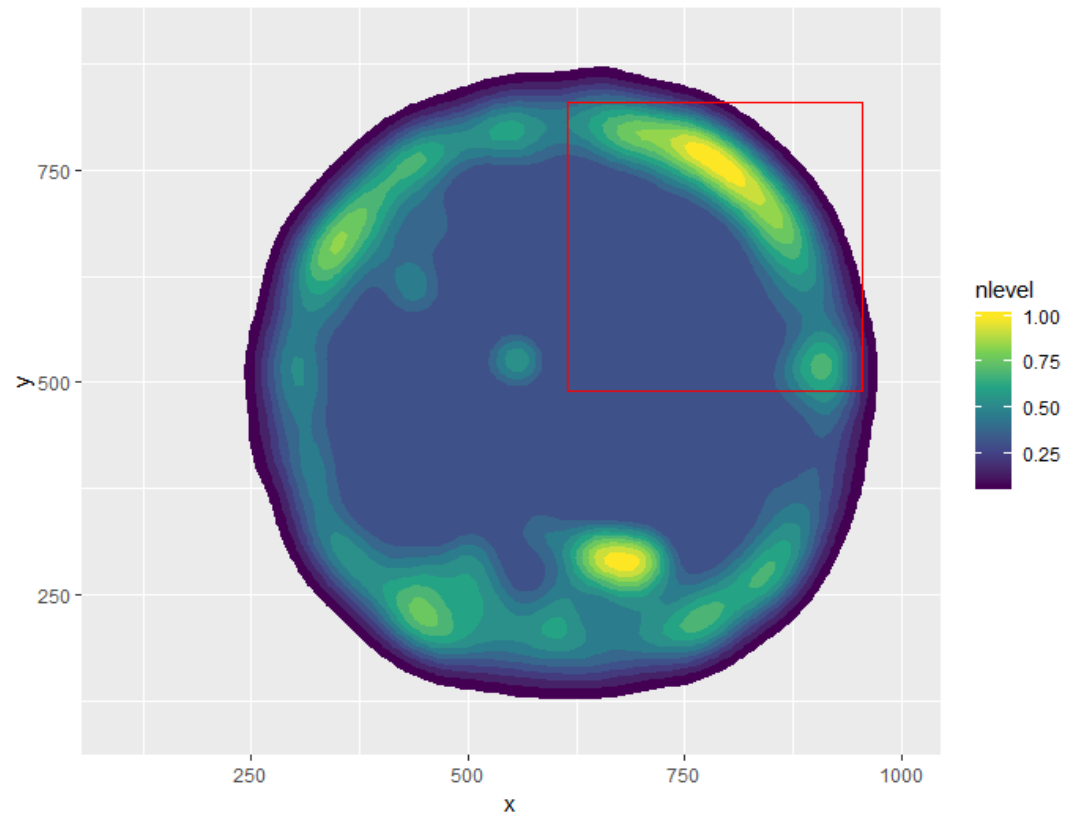
Red without backlight



Annex

Vibrations effect

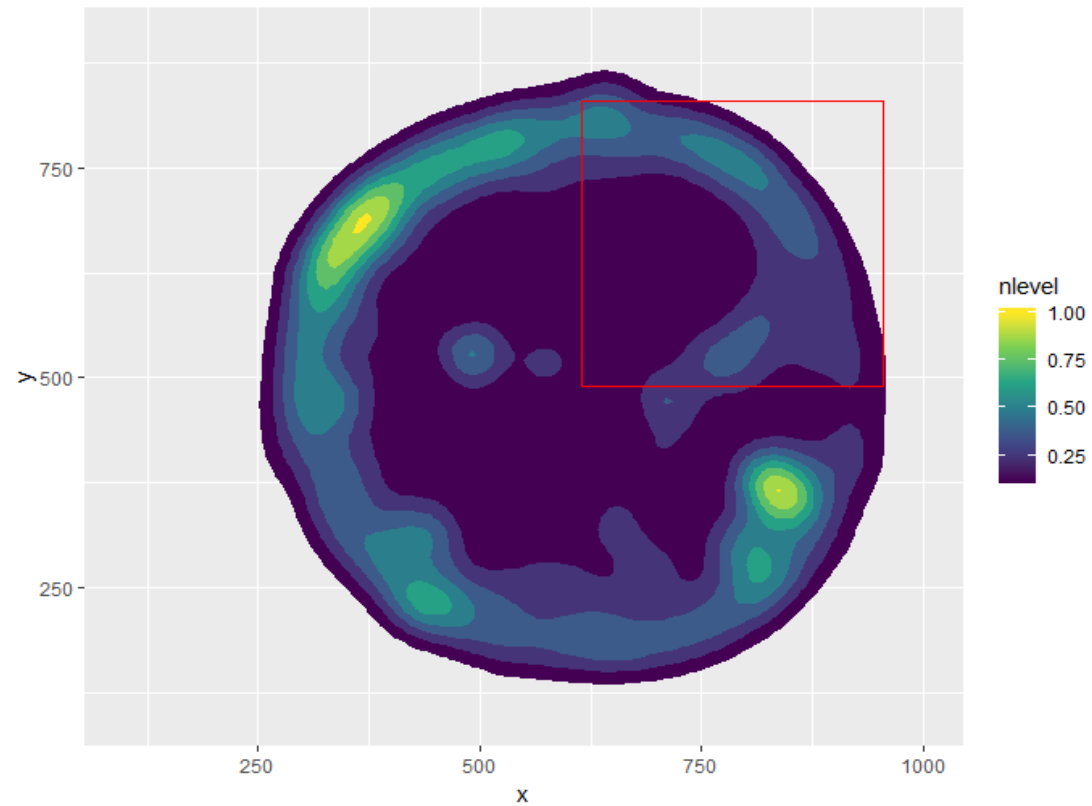
Safe zone



Annex

Vibrations effect

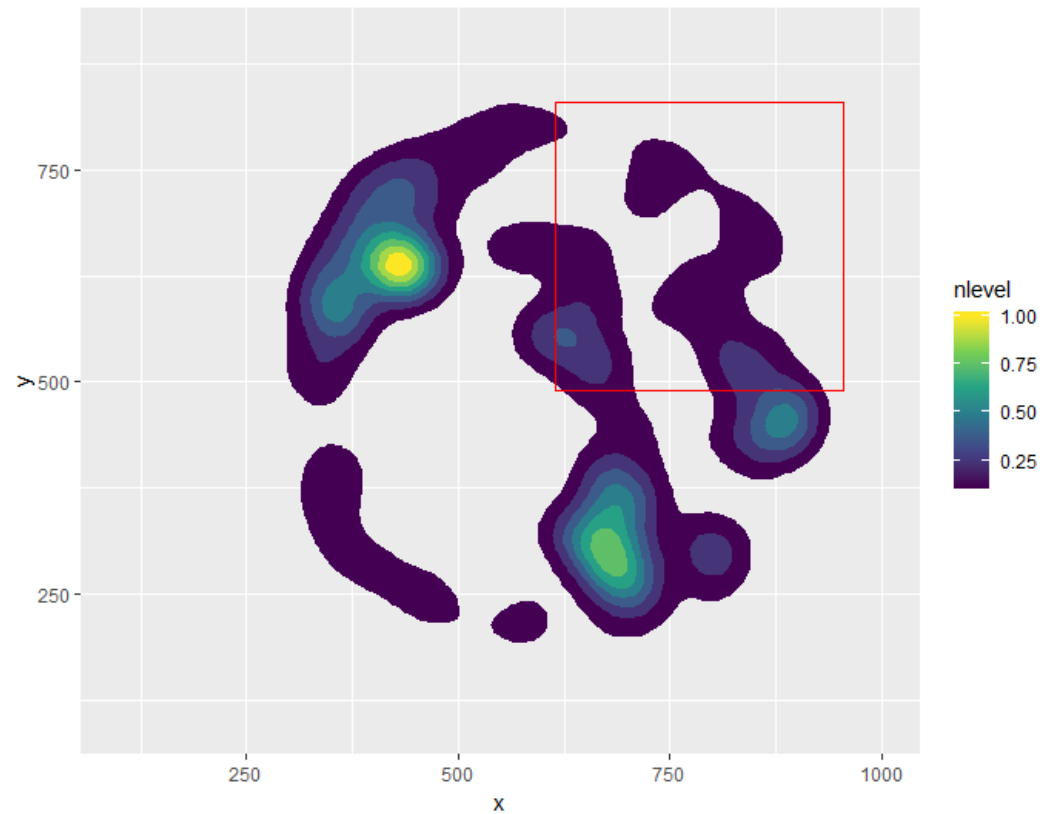
Vibration zone



Annex

Vibrations effect

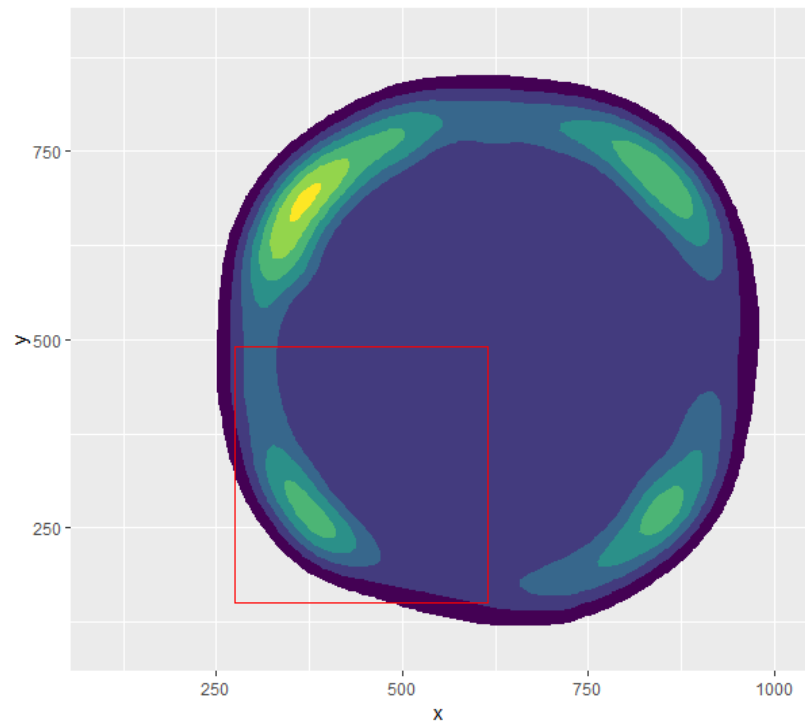
No vibration



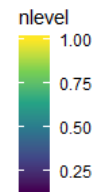
Annex

3 dark blue / 1 green : increase the contrast

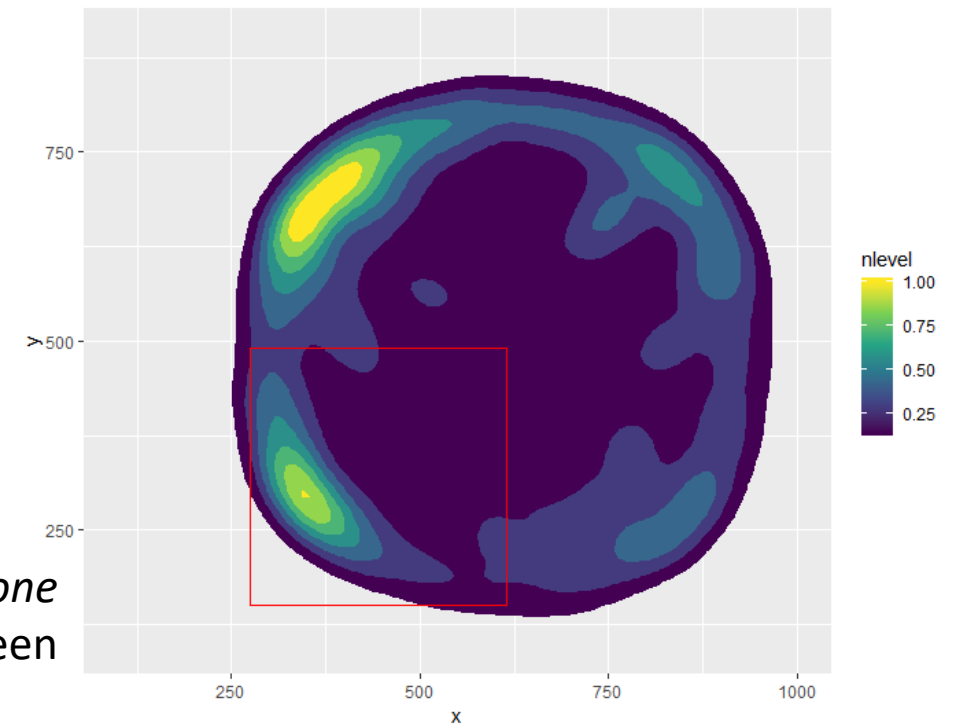
Safe zone



Exploration behaviour



No safe zone

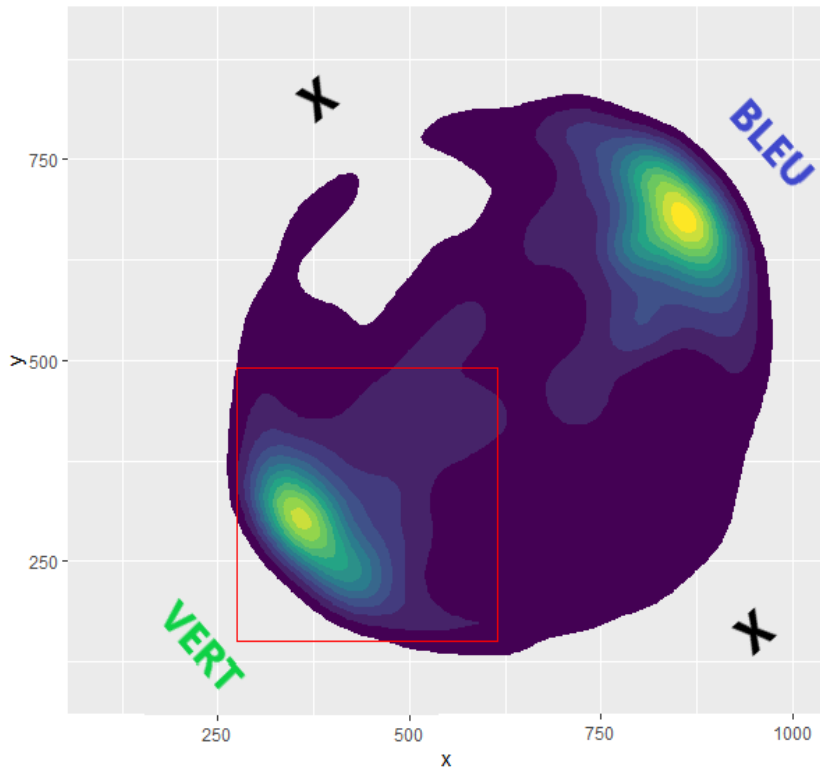


More in the last *safe zone*
and the defective screen

Annex

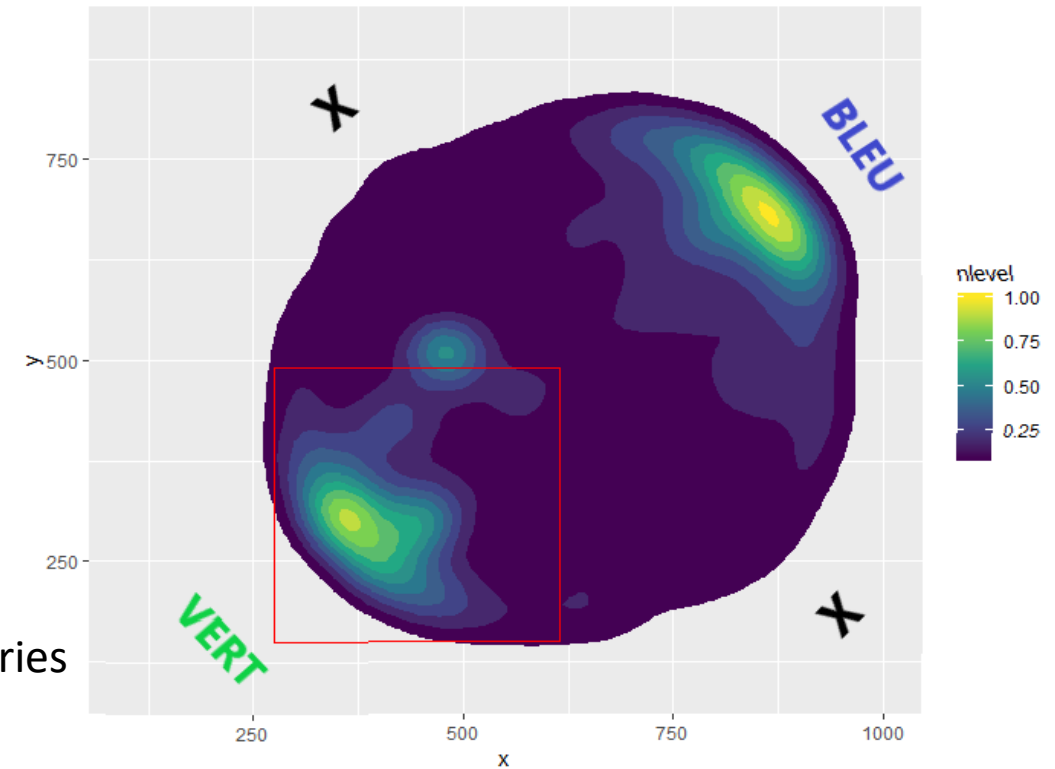
With 2 screens

Safe zone



Mainly back and forth
between the 2 screens

No safe zone

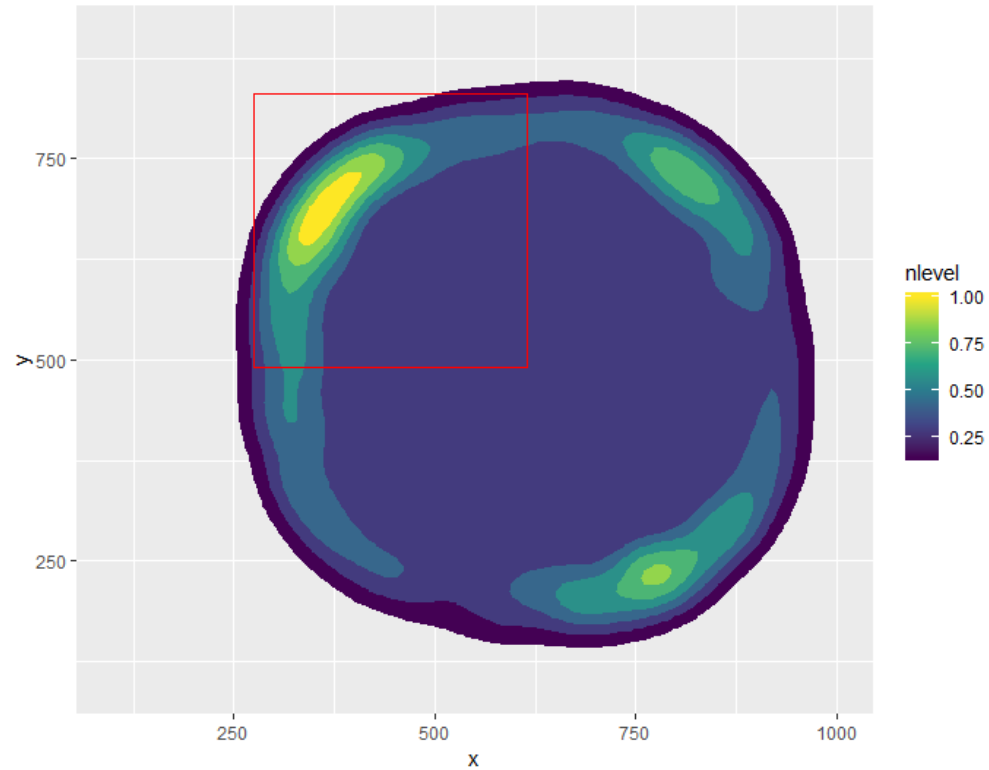


Wider trajectories

Annex

Defective screen = *safe zone*

Safe zone



No safe zone

