

Group name: Neural circuits in vision for action

IP name: Andreas Kardamakis

Group web: <https://in.umh-csic.es/en/grupos/neural-circuits-in-vision-for-action/>

Title of the MRP/TFM:

Circuit control of visual distraction

Summary of the Project:

How does the brain stay focused in a world full of distractions? This project investigates how the **visual cortex (VIS)**, **motor cortex (MC)** and **superior colliculus (SC)** circuits coordinate visual attention.

Using a **closed-loop behavioral paradigm**, mice are trained to orient toward task-relevant visual cues while ignoring distractors. We combine **deep learning-based video tracking**, **optogenetic circuit manipulation**, and **high-density electrophysiological recordings or calcium recordings** to explore the neural basis of attention. We then will test how **psilocybin**, a compound known to affect attention and perception, modulates these neural dynamics and behavior.

This project aims to uncover **mechanisms of visual attention distraction control**, and potential **therapeutic circuit targets** relevant to attention-deficit disorders.

Key Aims

- Map the contribution of V1→MC→SC circuits for target selection
- Measure attention-distraction interactions during circuit manipulations
- Investigate how drugs (eg psilocybin) alters attention and neural dynamics

Methods and technology involved in the MRP/TFM Project:

Techniques You'll Learn

- Mouse handling and attention task training
- High-resolution behavioral tracking with DeepLabCut
- Optogenetics, fiber photometry, calcium imaging or Neuropixel recordings
- Behavioral and neural data analysis (Python/MATLAB)
- Drug administration protocols and psychopharmacological testing

Who Should Apply

Ideal for students passionate about brain-behavior relationships, neural circuit dynamics in attention-distractor networks and the neural effects of psychedelics. Programming skills and willingness to work with animals are essential.

Prospective students are encouraged to establish early contact to discuss the project and their background.

Contact: akardamakis@umh.es or Dr. Giovanni Usseglio gusseglio@umh.es