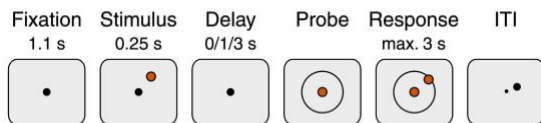


Programa formatiu en *Computational Biophysics*

Oferta de TFG

## Human neural correlates of working memory during a visuospatial detection task

Stimuli information (e.g., visual images) in cognitive processes such as working memory is processed by different brain regions to eventually produce a behavioral response. However, how this information is distributedly encoded and maintained across such regions in the human brain remains poorly understood. Nowadays, intracranial monitoring with depth electrodes (Fig. 1 left) of drug-resistant epileptic patients during pre-surgical diagnosis offers an exceptional window to analyze human electrophysiology (in the form of electroencephalography, EEG) during spontaneous and task-related activity. At the Epilepsy Unit of Hospital Clínic, Barcelona, we can record this activity while patients perform tasks such as the visuospatial working memory paradigm described below.



**Fig.1.** Visuospatial working memory paradigm. In each trial, subjects are to remember a stimulus that appears at a randomly chosen circular location with fixed distance to the center (black dot). Then, after a randomly generated delay (of 0, 1, or 2 s), the subject is asked to make a mouse click to report the remembered location within 3 seconds. The next trial starts after an inter-trial-interval (ITI).

**The objective of this work is to explore how the information about stimuli and responses can be decoded from the intracranial EEG signals of epileptic patients (Hospital Clínic) at different stages of the task using decoding/machine learning algorithms as well as information theory.**

### Proposta de TFG

The student's tasks will be (1) to deeply understand the task design, its main parameters, and behavioral variables (2) to analyze the recorded signals using signal processing, statistics, and machine learning tools (3) to interpret the results together with the team researchers.

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**Aplicació:** Enviar el CV (incloent l'expedient acadèmic) i una carta de motivació a la responsable del programa **abans del 3 d' octubre** (Clara Prats, [clara.prats@upc.edu](mailto:clara.prats@upc.edu))

**Finançament:** El grup de recerca BIOCÓM-SC atorgarà una beca INIREC a tres dels candidats que es presentin a la convocatòria del Programa formatiu en *Computational Biophysics* en la seva edició de 2022-2023, per a la realització del TFG.