



DEPARTAMENTO DE  
ANÁLISIS MATEMÁTICO Y  
MATEMÁTICA APLICADA



# SEMINARIO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA

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## **The intrinsic geometry of brain networks as a biomarker in epilepsy**

Epilepsy is a condition of recurrent unprovoked seizures resulting from different causes. This neurological disorder is nowadays conceptualized as a network disease with functionally and/or structurally aberrant connections on virtually all spatial scales. In epilepsy, brain networks generate and sustain normal, physiological brain dynamics during the seizure-free interval and are involved in the generation, maintenance, spread, and termination of pathophysiological activities such as seizures. Connectivity (network) analysis in epilepsy has provided valuable information on seizure onset, propagation and termination, as well on the functional organization of the brain after a resection surgery. Nevertheless, traditional (Euclidean) network embeddings are unable to fully capture the rich structural organization of brain connectivity, which motivates the quest for a latent geometry of the brain connectivity. In this talk I will show how non-Euclidean (hyperbolic) geometries can be used to represent brain networks of epileptic patients, and how these embeddings can provide an appropriate representation to unveil properties that could potentially result in robust biomarkers for surgery outcome. Namely, representation of brain networks in hyperbolic space can also identify regions of interest responsible or implicated in the surgery failure that could help understanding the origin of the unfavorable surgery outcomes for some patients.

**Organized by: Departamento de Análisis Matemático y Matemática Aplicada and Instituto de Matemática Interdisciplinar (IMI)**

**Date: Thursday, March 30, 2023**

**Place: Room 209 (Seminario Alberto Dou),  
Facultad de CC. Matemáticas, UCM**