



## Thesis Project Form

**Title (tentative):** Analyzing Brain Network Dynamics in Idiopathic REM Sleep Behavior Disorder

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### Description

#### Motivation and application domain

Idiopathic REM sleep behavior disorder (iRBD) is recognized as a prodromal stage of alpha-synucleinopathies. Patients with iRBD have a 70% chance of developing parkinsonism or dementia within 10-15 years. Prior studies have shown differences in electrophysiological activity between healthy controls and RBD patients. By employing standard and advanced approaches, this project aims to observe how brain networks change in these patients and identify which networks are predominantly affected.

#### General objectives and main activities

The primary goal of this project is to determine whether RBD impacts specific brain areas. This involves the following activities: (i) Preprocessing of EEG Signals: Cleaning and preparing EEG data for further analysis; (ii) Source Reconstruction Analysis: Observing changes in electroencephalographic activity within specific brain networks; (iii) Application of standard methods (e.g., network-based statistics) and advanced approach (e.g., graph neuronal network analysis).

#### Training Objectives (technical/analytical tools, experimental methodologies)

- Background Literature Analysis: Understanding previous research and theoretical underpinnings related to RBD and alpha-synucleinopathies.
- EEG Preprocessing: Learning techniques for cleaning and preparing EEG data.
- Source Reconstruction: Gaining skills in identifying and analyzing brain network changes.
- Network-based analysis in Python: Using Python to perform analysis tasks relevant to the project.

**Place(s) where the thesis work will be carried out:**

### Additional information

**Maximum number of students:** 1