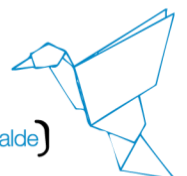


BCAM Internship Position Announcement

The following BCAM Internship position is open at BCAM – Basque Center for Applied Mathematics, an interdisciplinary research center located in Bilbao, Basque Country – Spain. The interested applicants can apply via the following webpage: <http://www.bcamath.org/en/research/internships>. It is strongly recommended to apply at least 3 months before the expected starting date.

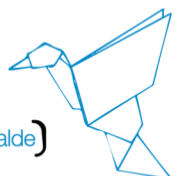
INTERNSHIP DATA	
Research topic title:	Multi-scale and multi-modal analysis of neuronal signals in epileptic patients
Research topic description:	About one epileptic patient out of four is diagnosed with intractable (drug-resistant) epilepsy, presenting severe, life-impairing seizures for which the only, currently available treatment option is surgical removal of epileptogenic neuronal circuits. The success of this surgery however depends on our ability to exactly identify epileptogenic circuits. This task is challenged by the emerging hypothesis that epileptogenic circuits are distributed rather than localized in a single brain spot. In turn, this distributed scenario suggests that epileptic seizures present multi-scale spatial organization in conjunction with hierarchical temporal activation of multiple neural circuits. In line with this hypothesis is the observation that the spectrum of oscillatory neural electrical activity during seizures recorded by electroencephalography (EEG) presents multiple frequency components, ranging from milli- to kilo hertz. It remains however unclear how to relate such temporal structure with the underlying spatially-organized activation of epileptogenic neural networks. The aim of this internship is to gain familiarity with development of mathematical and modelling techniques that could help the analysis of spatial and temporal correlations in epileptic neural activity. The intern will work in collaboration with Dr. Maurizio De Pittà (BCAM) to adapt current models of neuron-glia networks to reproduce epileptic seizures, and with Dr. Paolo Bonifazi (BioCruces) for the analysis of neural time series and brain networks.
Keywords:	computational neuroscience, time-series analysis,



	complex networks, epilepsy, neuron-glia interactions
•Required knowledge and skills:	<ul style="list-style-type: none"> • Basic knowledge of graph theory and statistical data analysis, and numerical integration • Essential programming skills in MATLAB and/or Python • Basic knowledge in neuroscience is a plus • Ability to meet deadlines • Strong interest to pursue research in complex network theory
Required language skills¹:	English
Duration and dates:	6 months (to define, between March – September 2019). 3 months of the Internship will be at BCAM (Bilbao) and the other 3 months at BIOCRUCES.
Covered expenses:	A total of 2.100€ net for the 6 months.
Application deadline:	March 1 st , 2019 (or till position is filled)

SUPERVISOR DATA	
Supervisor:	Maurizio De Pittà (BCAM) & Paolo Bonifazi (BioCruces)
Research line:	MCEN
Email:	mdepitta@bcamath.org paolo.bonifazi@osakidetza.eus

¹ Note that English is the official language at BCAM.

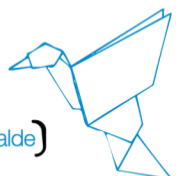


Request for BCAM Internship: 1st Phase

This form signed by the Supervisor and by PIs of the funding projects must be handed in to the Administrative Coordinator of the BCAM Internship program well before the application deadline (it is recommended to do so at least 2 months in advance), together with the document titled “BCAM Internship Position Announcement”, which will be published on the BCAM internship webpage.

Please, note that BERC funding will be assigned to internship positions according to BCAM development priorities and additional requirements may exist.

INTERNSHIP DATA	
Research topic title:	Multi-scale analysis of neuronal signals in epileptic patients
Additional research training:	<ul style="list-style-type: none"> The intern will learn how to use tools borrowed from graph theory and information theory will be deployed to analyse experimental data collected by (I) deep (stereo-) electroencephalography (sEEG); (ii) resting-state functional magnetic resonance imaging (rs-fMRI); and (iii) diffusion-weighted magnetic resonance imaging (dw-MRI). The intern will: (i) analyze experimental data to compare how non-invasive MRI-based networks reconstruction correlate with functional networks inferred from sEEG; (ii) develop accurate estimators of epileptogenic circuits based on such correlative analysis. The intern will also familiarize with current approaches in biophysical modeling of complex neural networks, exploring on specific mechanisms of neuron-gliial interactions that could account for spatio-temporal organization of epileptiform activity.
Expected outcomes, deliverables and contributions:	Depending on the agreement, this internship can be part of bachelor or master program of the Applicant with the Supervisors that MAY BE (or NOT) formal (co-)advisors
	Code and Software for reconstruction and analysis of neural functional and structural connectivity
	Contribution to at least one conference poster and one journal paper



SUPERVISOR DATA	
Supervisor:	Maurizio De Pittà
Email:	mdepitta@bcamath.org
Secondary Supervisor (if needed):	Paolo Bonifazi (BioCruces)
Email:	paolo.bonifazi@osakidetza.eus

FUNDING DATA			
Concept	Amount	Funding source	Signature of PI
Insurance*:	N/A	N/A	
Accommodation:	N/A	N/A	
Travel costs:	N/A	N/A	
Monthly remuneration:	- 3 MONTHS AT BCAM: 350 EUR/month (net), covered by BCAM. - 3 MONTHS AT BIOCRUCES: If they remunerate the student, would be covered by BIOCRUCES (not BCAM).	BERC	

* If the Applicant has no Social Security coverage

Date:	02/04/2019
Signature of the Supervisor:	Maurizio De Pittà
Signature of the Secondary Supervisor (if needed):	Paolo Bonifazi

