

## PhD fellowship in Mathematical Neuroscience

### Job Offer

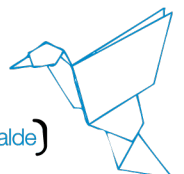
Topics:

#### Computational modeling and data mining of early markers of Alzheimer's disease

Applications are invited for a PhD project of 3 years at the group of Mathematical, Computational and Experimental Neuroscience (MCEN) at BCAM. The focus of the project will be on modeling biophysical processes mediated by interacting neurons and glial cells that could underpin the onset of Alzheimer's disease (AD).

Alzheimer's disease (AD) is a chronic, age-related neurodegenerative disorder characterized by cognitive decline, memory loss, personality changes, and withdrawal. The causes of AD remain poorly understood and no treatment is currently available to stop or reverse the progress of the disease nor to reduce the risk of developing it. The principal pathological hallmark of AD is the accumulation in the brain of senile plaques, primarily composed of the amyloid beta ( $A\beta$ ) peptide, and tangles of filaments of hyperphosphorylated tau protein. However, population-based studies show that there is a continuum of AD type pathology in the aging population, with considerable overlap in the burdens of tangle and plaque pathology in demented vs. non-demented individuals. It is therefore difficult to establish thresholds of classical lesions for the prediction of dementia and additional factors are operative to determine whether a given burden of pathology is associated with cognitive impairment. There is therefore a need to explore non-standard pathological markers.

The candidate will work under the supervision of Dr. De Pittà (MCEN group at BCAM) to develop mathematical tools to simulate biophysical processes that could underpin deposition of amyloid beta plaques and tau filaments. Emphasis will be on emerging evidence on the interaction between neurons and glial cells, to identify potential mechanisms that promote local excitation of neuronal networks at the onset of AD, before cognitive impairment takes over, or when only mild cognitive deficits are diagnosed. In parallel, the candidate will also collaborate with Dr. Elena Alberdi and other experimental neuroscientists from Prof. Carlos Matute's group at Achucarro – the Basque Center for Neuroscience in Bilbao, at the local campus of the University of the Basque Country (UPV/EHU). The candidate will thus be able to design realistic models inspired by experiments in cell cultures and brain slices from

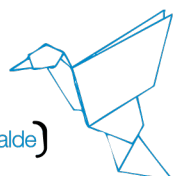


	<p>AD mouse models. At the same time she/he will be able to inform experiments based on predictions from her/his models.</p> <p>This is a cutting-edge PhD project that ideally matches with outstanding and creative candidates, with a strong motivation for international collaborations, mobility, and independence. The candidate will have to work on the project full-time.</p>
PI in charge:	Dr. Maurizio De Pittà (PhD Advisor) Prof. Serafim Rodrigues (Group Leader)
Salary and conditions:	<p><b>The gross annual salary of the scholarship will be 18.000€.</b></p> <p>It will then be on your own responsibility to make your yearly income declaration at the Bizkaia Treasury Agency.</p> <p><i>Free access to the Public Health System in Spain is provided to all employees.</i></p>
No Positions offered:	1
Duration:	<b>3-year contract</b>
Deadline:	<b>November 6<sup>th</sup>, 2018 14:00 CET</b>
How to apply:	Applications must be submitted on-line at: <a href="http://www.bcamath.org/en/research/job">http://www.bcamath.org/en/research/job</a>

### Scientific Profile Requested

Requirements:	<ul style="list-style-type: none"> <li>• Master's degree (or equivalent) in Physics, Mathematics, Engineering, or related fields.</li> <li>• High motivation for interdisciplinary research with strong interests for biological details with an analytic mindset.</li> <li>• Essential knowledge of neuroscience, cell biology and biochemistry is preferred but not required.</li> <li>• Full-time involvement in the PhD project.</li> </ul>
Skills and track-record:	<ul style="list-style-type: none"> <li>• Excellent English skills (oral and written).</li> <li>• Good interpersonal skills.</li> <li>• Ability to effectively communicate and present research ideas to researchers with different background (e.g. mathematicians, biologists, engineers, physicists).</li> <li>• Capacity to meet deadlines.</li> </ul>
Scientific Profile:	<p>The preferred candidate has:</p> <ul style="list-style-type: none"> <li>• Knowledge of ODEs and PDEs, with essential background in bifurcation theory of nonlinear dynamical systems.</li> <li>• Knowledge of probability and statistics.</li> <li>• Familiarity with numerical integration and continuation methods.</li> <li>• Mandatory programming skills in Matlab and or Python and C/C++.</li> </ul>

### Application and Selection Process



**IC2018\_Autum BCAM  
International Call**

Formal Requirements:	The selected candidate must have applied before the application deadline online at the webpage <a href="http://www.bcamath.org/en/research/job">http://www.bcamath.org/en/research/job</a>  The candidates that do not fulfil the mandatory requirements will not be evaluated with respect to their scientific profile.
Application:	Required documents: <ul style="list-style-type: none"> <li>▪ CV</li> <li>▪ Cover letter (max 2 pages)</li> <li>▪ 2 recommendation letters</li> </ul>
Evaluation:	Based on the provided application documents of each candidate, the evaluation committee will evaluate qualitatively: how the candidate's previous training and career fits with the offered profile, and how the recommendation letters and the candidate's cover letter could guarantee a successful outcome of the project.

<b>Incorporation:</b>	<b>January 2019 or as soon as possible thereafter.</b>  <i>The BCAM doctoral contract will start when the selected candidate has finished the Master.</i>
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<b>Time frame:</b>	<ul style="list-style-type: none"> <li>- Open Call: October 16<sup>th</sup>, 2018</li> <li>- Deadline for applications: November 6<sup>th</sup>, 2018</li> <li>- Evaluation: November 2018</li> <li>- Publication the results on website: December 2018.</li> <li>- Incorporation: January 2019 or as soon as possible thereafter</li> </ul>
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Project funded by:

