# 2012 Cajal Blue Brain Project

One of the main goals of neuroscience is to understand the biological mechanisms responsible for human mental activity. In particular, the study of the cerebral cortex is and without any doubt will be the greatest challenge for science in the next centuries, since it represents the foundation of our humanity. In other words, the cerebral cortex is the structure whose activity is related to the capabilities that distinguish humans from other mammals. Thanks to the development and evolution of the cerebral cortex we are able to perform highly complex and specifically human tasks, such as writing a book, composing a symphony or developing technologies. For these reasons the Blue Brain project emerged in 2005, when the L’Ecole Polytechnique Fédérale de Lausanne (Switzerland) and IBM jointly launched an ambitious project to create a functional brain model by means of reverse engineering of the mammalian brain, using the Blue Gene supercomputer from IBM. The aim was to understand the functioning and dys-function of the brain through detailed simulations. By late 2006, the Blue Brain project had created a model of the basic functional unit of the cerebral cortex, the neocortical column. However, the goals set by the project, which covered a period of 10 years, imposed its conversion into an international initiative (The Blue Brain Project, Nat Rev Neurosci. 7, 153–160, 2006). In this context, the Cajal Blue Brain project (CajalBBP), the Spanish contribution to this international project, started in January 2009. The CajalBBP is hosted by the Universidad Politécnica de Madrid (UPM) in the Campus of Montegancedo, supported by two of its research centers, the Centro de Tecnología Biomédica (CTB) and the Centro de Supercomputación y Visualización de Madrid (CeSViMa).

Research Modules and teams involved during the fourth year of the project are as follow:

- **Neuroscience**:
  - Neuroscience Module: Cajal Cortical Circuits Laboratory, CCCL (UPM-CSIC): hosted at the CTB (Campus of Montegancedo).

- **Neuroinformatics**:
  - Informatics Tools (UPM) hosted at CeSViMa
  - Data Analysis Module (UPM) at the Computer Science School.
  - Visualization Module (UPM) at the Computer Science School.
  - Image Processing Module at the Computer Science School.

- **External collaborators**:
  - Cell Physiology Cajal’s Laboratory (FCAN): From Instituto Cajal (CSIC).
  - Modeling and Virtual Reality Group (GMRV)
  - University of Oxford (this collaborator was previously located at the IMDEA Materials but has recently moved to the University of Oxford).
  - ETSII-UPM
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Most Relevant Contributions


Angel Merchán-Pérez, José-Rodrigo Rodríguez, Santiago González, Víctor Robles, Javier DeFelipe, Pedro Larrañaga, Concha Bielza. Three-Dimensional Spatial Distribution of Synapses in the Neocortex: a Dual–Beam Electron Microscopy Study. Cerebral Cortex: accepted

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The following tables summarize all the RTD Actions, directly linked with the project, that were applied for or were ongoing during 2012 and in which CajalBBP participants were involved:

<table>
<thead>
<tr>
<th>ACTION</th>
<th>Funding Organization</th>
<th>Requested Budget (In Euros)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental Non-oriented RTD Projects (SAF2010)</td>
<td>MICINN</td>
<td>127,080 €</td>
<td>Awarded</td>
</tr>
<tr>
<td>Fundamental Non-oriented RTD Projects (AMCA-BFU2012-34963)</td>
<td>MICINN</td>
<td>199,650 €</td>
<td>Awarded</td>
</tr>
<tr>
<td>Scientific Culture and Innovation Programme 2012 (FECYT-MICINN)</td>
<td>MICINN</td>
<td>46,421,53 €</td>
<td>Rejected</td>
</tr>
<tr>
<td>Complementary Actions (AACC 2012 MICINN)</td>
<td>MICINN</td>
<td>12,000 €</td>
<td>Awarded</td>
</tr>
<tr>
<td>Tu mascota y la enfermedad del Alzheimer</td>
<td>NA</td>
<td>NA</td>
<td>Ongoing</td>
</tr>
<tr>
<td>ERANET NEURON</td>
<td>EC</td>
<td>279,752 €</td>
<td>Rejected</td>
</tr>
<tr>
<td>7FP_COOPERATION: FET flags-hips (HBP)</td>
<td>EC</td>
<td>1,190 M € (54 M € in Ramp Up Phase)</td>
<td>Awarded</td>
</tr>
<tr>
<td>7FP_ERC_Synergy Grant</td>
<td>EC</td>
<td>6,6 M €</td>
<td>Submitted</td>
</tr>
</tbody>
</table>

### 2013 Alzheimer 3π

This determined project, very big in size and resources, is one of the most relevant initiatives that the Cajal Blue Brain Project is currently being carried out, under an integrating and multi-disciplinary approach with international dimension. During 2012 the project was submitted to an open call of the BBVA Foundation but it was no succeed. We’re currently seeking funds to implement the core of the project; meanwhile several tasks have been started.

**Project Fiche:**
- **Project Title:** ‘Alzheimer 3π’
- **Funding Organism:** Private Funding
- **Participant Entities:** UPM, CSIC, FRS, AFALcontigo Foundation, Cien Foundation, CSIC-UAM, along with other partners.
- **Principal Investigator:** Prof. Javier DeFelipe
- **Duration:** 5 years (to be extended)
- **Total Budget Requested:** Euros 11M
- **Status:** Ongoing
The Cajal Blue Brain Project is hosted by the Universidad Politécnica de Madrid (UPM) in the Scientific and Technological Park of Montegancedo Campus. Computational needs and support infrastructure required by CajalBBP are provided by two of the Research Centers of the Park, the Centro de Tecnología Biomédica (CTB) and the Centro de Supercomputación y Visualización de Madrid, CeSViMa, which is focused on the massive storage of information, high-performance computing and advanced interactive visualization.

More information: www.ctb.upm.es