POLITECNICO DI MILANO

PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

THEMATIC Research Field: SVILUPPO DI METODI AVANZATI PER LO STUDIO DELLA CONNETTOMICA CEREBRALE MEDIANTE IMMAGINI DI RISONANZA MAGNETICA MULTIPARAMETRICA - DEEP LEARNING METHODS FOR MAGNETIC RESONANCE IMAGES TO ASSESS THE HUMAN BRAIN CONNECTOME

Monthly net income of PhDscholarship (max 36 months)
€ 1250.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	The brain is a complex, interconnected network and its connection topology fundamentally shapes the onset, expression and progression of physio-pathological modifications due to ageing and neurological diseases. To understand such changes requires knowledge of how brain networks respond - either adaptively or maladaptively - to physio-pathological perturbations. MRI allows the study of the macroscopic connectome non-invasively, through structural and functional connectivity, and can provide insights on brain plasticity, by assessing topological arrangement of brain connections, their development, remodelling, and efficiency and by investigating the mechanisms and impact of disrupted brain connections.
Methods and techniques that will be developed and used to carry out the research	During his/her PhD, the student will develop advanced Deep Learning methods for the structural and functional connectomes mapping using human brain MR images. The research activity will be focused on the extraction of new biomarkers for the characterization of brain alterations due to ageing and/or neurological disorders (e.g., Alzheimer¿s Diseases, Stroke, etc.) The student will gain competencies in image processing and analysis (fMRI and dMRI) and artificial intelligence in biomedical applications.

	The PhD project will be carried out in cooperation with the Institute of Biomedical Technologies of the National Research Council.
Educational objectives	We provide doctoral candidates with high-level scientific training, fostering and refining research and problem-solving abilities by focusing on both theoretical and experimental skills. A PhD in Bioengineering will be trained to layout, draft and carry-on original research, by leading a research group or working in a team. The didactic offer of the PhD in Bioengineering (https://www.phdbioengineering.polimi.it/) will be integrated by schools and workshops specific to the research topic.
Job opportunities	The skills and expertise developed during the PhD Program are suitable for national and international academic institutions, research organizations and high-tech SMEs committed to innovation, fundamental/applied research and technical development both in imaging and AI. Examples: product specialist, application specialist, R&D.
Composition of the research group	2 Full Professors 2 Associated Professors 7 Assistant Professors 3 PhD Students
Name of the research directors	Prof. Giuseppe Baselli - Alfonso Mastropietro

Contacts
giuseppe.baselli@polimi.it alfonso.mastropietro@cnr.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	625.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
ITB-CNR will provide a desk and a PC to the candidate during the whole PhD period.