CIVIS A European Civic University

CIVIS call for researchers MSCIF 2020

PANEL: Mathematics (MAT)

Co-funded by the Erasmus+ Programme of the European Union

NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS – Greece					
SUPERVISOR	RESEARCH LAB/GROUP	AREA OF EXPERTISE	LINES OF INVESTIGATION	KEY FACILITIES	WEBSITE
ANDROULIDAKIS Iakovos	Department of Mathematics, Section of Algebra and Geometry	Noncommutative Geometry, Singular foliations, Index theory	Foliations appear in the study of Dynamical Systems. Some classical Geometric examples are orbits of Lie group actions and the symplectic foliation of a Poisson manifold. In most cases these foliations are singular. Important examples of singular foliations also arise in Representation Theory, e.g. the Bruhat decomposition of a Grassmannian. And in Analysis: Hoermander showed that the propagation of singularities follows the integral curves of the Hamiltonian vector field associated with the principal symbol. In general, singular foliations are much more common than the regular ones. I'm concerned with (very) singular foliations. My work focuses on understanding the topology of the associated leaf space, which is usually quite pathological. I use Noncommutative Geometry (NCG) for this purpose. NCG replaces topological spaces with suitable operator algebras. This way, the inherent topological pathology is reflected to the noncommutativity of the convolution product. The associated K-theory then accommodates the topological invariants involved, such as characteristic classes and index theory. Also the spectral theory of the operators involved. By and large, my work carries out this program for the leaf space of a singular foliation. In order to build the operator algebra which replaces a topological space, we need to understand its external symmetries. The geometric objects which describe such symmetries are groupoids. They give rise to algebras of pseudodifferential operators. In the case of foliations, holonomy provides the groupoid which models the leaf space. For singular foliations in particular, the notion of bisubmersion provides a very stable way to keep track of holonomy and eventually build the associated groupoid. Groupoids also play a crucial role in Mathematical Physics, where one can find lots of singularities. The Baum-Connes conjecture establishes a strong relation of all this with Representation theory. One question is to what extend it is possible to use the Noncommutative Geometry of singular foliations in order to understand better certain aspects of Representation Theory. Also, somewhere in the intersection of Representation Theory with sub-Riemannian Geometry, it seems that bisubmersions can also be used to build (hard!) Analysis on objects more general than singular foliations. Such objects are singular foliations endowed with a (Lie) filtration, and generalised smooth distributions.	Office space, Computers, Library	http://scholar.uoa.gr/iandroul/home

UNIVERSITY OF BUCHAREST - Romania

contact person : Filuta Ionita filuta.ionita@cdi.unibuc.ro

SUPERVISOR	RESEARCH LAB/GROUP	AREA OF EXPERTISE	LINES OF INVESTIGATION	KEY FACILITIES	WEBSITE
Prof. Dr. Alexandru Popa	Faculty of Mathematics and Computer Science, Department of Computer Science	Algorithms, Data Structures, Distributed Computing, Operations Research, Artificial Intelligence	NP-hard problems, approximation algorithms, fixed parameter algorithms, heuristics, integer linear programming	Since our research is mainly theoretical, no special infrastructure is needed except office space and internet connection. Our main asset is a talented group of young researchers. In the algorithms group there are currently 4 PhD students under my supervision working in various fields (graph theory, string algorithms, security and finance problems) and one faculty member who completed his PhD recently under my supervision (expert in combinatorial optimization). It is also worth mentioning that our group is international so the invited researchers can easily integrate. Moreover, we plan to extend our group with a couple of more PhD students beginning with September.	http://alexpopa.neociti es.org

UNIVERSITÉ LIBRE DE BRUXELLES - Belgium

contact person: Emily Mainetti ulb-europe@ulb.be

SUPERVISOR	RESEARCH LAB/GROUP	AREA OF EXPERTISE	LINES OF INVESTIGATION	KEY FACILITIES	WEBSITE
Jean Cardinal	Computer Science Department - Algorithms Research Group	Theoretical computer science, discrete mathematics	Theory, algorithms, computational geometry, data structures, graph theory, combinatorics		https://algo.ulb.be/

UNIVERSIDAD AUTÓNOMA DE MADRID (UAM) - Spain

SUPERVISOR	RESEARCH LAB/GROUP	AREA OF EXPERTISE	LINES OF INVESTIGATION	KEY FACILITIES	WEBSITE
Florentino Borondo	Química and Instituto de Ciencias Matemáticas (ICMAT)	Deep Learning, Reservoir Computing, Quantum Chaos, Molecular Vibrations	Deep Learning andResevoir Compting applied to the solution of Schrödinger Eq.; Quantum Manifestation of Classical Chaos in Vibrations	Excellent access to computing facilities and libraries at the group and ICMAT	https://portalcientifico. uam.es/ipublic/agent-personal/profile/iMarin aID/04-260097

SAPIENZA UNIVERSITY OF ROME - Italy

contact person: rosa.distefano@uniroma1.it

SUPERVISOR	RESEARCH LAB/GROUP	AREA OF EXPERTISE	LINES OF INVESTIGATION	KEY FACILITIES	WEBSITE
Maria Rosaria Lancia	Fast diffusion across fractal interfaces	Diffusion models in irregular domains with irregular interfaces and/or boundaries	We are interested in the study of scalar and vector BVPs in and within irregular domains possibly fractal and in thier numerical approximation . In particular we study local and nonlocal (fractional) diffusion problems as well as fractal Vector BVPs coming from Magnetostatics or Fluidynamics.	Computer Lab, advanced software, library and all the tools necessary to carry on our research	https://www.sbai.uniro ma1.it/Fast_diffusion_a cross_fractal_interface s