TOPICS IN COMPLEX AND HARMONIC ANALYSIS

NICOLA ARCOZZI

The project revolves around several topics in Complex and Harmonic Analysis which are currently object of investigation in our department, more specifically in the group working in Complex and Harmonic Analysis. The postdoctoral fellowship's holder is expected to be able to start research activity on one of the topics listed below at the inception of the Scholarship.

(a) **Holomorphic Hilbert spaces** in one and several complex dimensions. Of special interest here are the Drury-Arveson space and the potential theory related to its kernel; holomorphic and harmonic Dirichlet spaces on poly-discs; problems concerning interpolating and sampling sequences (in the deterministic as well as in the random sense) on a variety of holomorphic spaces.

(b) **Time-frequency analysis**, with applications. A special focus is on time-frequency analysis on various geometric structures (sub-Riemannian, Riemannian...), also having in mind applications to MRI, neurophysiology of the visual cortex, etcetera.

(c) **Integral inequalities via Bellman functions**; with an emphasis of the interplay between Stochastic Optimal Control Theory and Integral Inequalities.

(d) **Applications of Harmonic Analysis and Reproducing Kernel Theory to Machine Learning**. The starting point of the project concerns the class of Random Forest Algorithms.

The candidates are expected to have a proven, previous exposure, and possibly research experience, in at least one of the following areas: harmonic analysis, analysis on sub-Riemannian geometric structures, complex analysis, stochastic processes, potential theory.

Timetable:

Mo. 1-3 Preliminary study of existing literature, acquaintance with the problem. The Scholarship's holder delivers one or more seminars on her/his previous activity, and on the material considered in the first months.

Mo. 4-11 Research activity.

Mo. 12 A research report is written with the findings of the research work, which is expected to lead to an article on a research journal.

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Nicola Arcozzi