# Abstracts of Workshop Lectures

### The angle of an operator and range - kernel complementarity

**Dimos Drivaliaris, University of the Aegean**

In my talk I will discuss the relation between the angle of an operator $A : X \to X$ on a complex Banach space $X$ and its range and kernel being complementary.

I will show that if the angle of $A$ is less than $\pi$, and $A$ has closed range and its range and kernel have closed sum, then its range and kernel are complementary. If $X$ is a Hilbert space, then I will show that in the previous result we don't need to assume that the range and the kernel of $A$ have closed sum.

I will also show that if $X$ is a strictly convex, finite dimensional Banach space and $A : X \to X$, then the range and the kernel of $A$ are complementary if and only if there exists $0 \neq t \in \mathbb{C}$ such that the angle of $tA$ is less than $\pi$.

The talk is based on joint work with N. Yannakakis.

### Hyperbolic Dynamical Systems and Topological Invariants

**Dimitrios Gerontogiannis, University of Glasgow**

Hyperbolic dynamical systems are systems that locally look like a product of a stable and unstable set, where the first is contracting and the latter is expanding, both exponentially fast. This behaviour can be seen both in smooth and in highly non-smooth spaces. Examples are Anosov diffeomorphisms, subshifts of finite type, substitution tilings, solenoids, etc. Smale spaces are an axiomatic way to study these systems. Our approach is to encode the structure of a Smale space to a groupoid C*-algebra, which turns out to have remarkable properties. Then, using tools from non-commutative topology like KK-theory, one can recover very interesting topological invariants for the dynamical system. For example a zeta function.

### The set of non extendible functions

**V. Nestoridis, University of Athens**

We replace a theorem of Banach by Montel's theorem in Complex analysis and we prove that if a function space $X$ satisfies some assumptions, then the set of non extendible elements of $X$ not only contains a $G_\delta$ and dense subset of $X$ but it is itself a $G_\delta$ dense set.