Università di Torino
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## Mercoledì 10 settembre ore 11:30 aula C

# Some model theory of Polish structures

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I have introduced Polish structures in order to apply model theoretic ideas in the studies of purely descriptive set theoretic and topological objects such as Polish $G$-spaces or, more generally, Borel $G$-spaces. In particular, Polish structures generalize profinite structures introduced by Newelski. Polish structures allow us to apply ideas and techniques from model theory, descriptive set theory, topology and the theory of profinite groups.

A Polish structure is a pair $(X, G)$ where $G$ is a Polish group acting (faithfully) on a set $X$ so that the stabilizers of all points are closed subgroups of $G$. We say that $(X, G)$ is small if for every natural number $n$ there are countably many orbits on $X^n$ under $G$.

A simple non-profinite example of a small Polish structure is the unit circle with the full group of homeomorphisms. In fact, most natural examples of compact metric spaces with the full group of homeomorphisms are small Polish structures. More complicated examples are Hilbert cube and the pseudo-arc with the full group of homeomorphisms.

I will start my talk with some basic things about profinite structures. Then I will concentrate on Polish structures. I will discuss a purely topological notion of independence, called non-meager independence, that satisfies some nice properties (e.g. symmetry, transitivity, existence of independent extensions) in small Polish structures, and so allows us to introduce basic stability-theoretic concepts and to prove fundamental results about them (e.g. Lascar inequalities). In profinite structures this notion of independence coincides with $m$-independence introduced by Newelski.

If time permits, in the second part of my talk I will concentrate on the structure of small compact $G$-groups, i.e. small Polish structures $(X, G)$ where $X$ is a compact group and $G$ acts continuously on $X$ as a group of automorphisms. I will present an example of such a group which is not solvable-by-finite. On the other hand, under a natural model theoretic assumption of 'superstability' with respect to non-meager independence, each such group is solvable-by-finite, and assuming finiteness of the underlying rank, it is even nilpotent-by-finite.

I will finish with some open questions.