PROGRAM

February, 16

10.00-10.50: **Mahuya Datta**
11.00-11.50: **Andrea Sambusetti**
15.00-15.50: **Massimiliano Pontecorvo**
16.00-16.50: **Riccardo Piergallini**

February, 17

10.00-10.50: **Yakov Eliashberg**
11.00-11.50: **Sylvestre Gallot**
15.00-15.50: **Gérard Besson**
16.00-16.50: **Lucia Alessandrini**

ABSTRACTS

1) **Lucia Alessandrini**

"Forms and currents defining generalized p-K\"ahler structures"

ABSTRACT
We shall give an unified presentation of generalized p-K\"ahler manifolds and in particular we shall introduce a Characterization Theorem for compact generalized p-K\"ahler manifolds. Its proof is based on the classical duality between "closed" positive forms and "exact" positive currents, following Sullivan, Harvey and Lawson et al.
In the last part of the talk we approach the general case of non compact complex manifolds, where "exact" positive forms seem to play a more significant role than "closed" forms.

2) **Gérard Besson**

"Margulis'Lemmas, compactness and finiteness Theorems without curvature"

ABSTRACT
We will describe a work in progress, in collaboration with G. Courtois, S. Gallot and A. Sambusetti, where we prove compactness and finiteness results without curvature assumptions. One of the tools is a curvature-free Margulis' Lemma. The talk will be elementary.

3) **Mahuya Datta**

"Gromov's conjecture on non-free isometric immersions"

ABSTRACT
The differential equation describing isometric immersions of a Riemannian manifold (M,g) of dimension n into the Euclidean space $\mathbb R^q$ is an underdetermined system in the range $q > n(n+1)/2$.
By a celebrated result, due to John Nash, the associated differential operator $\mathcal D:f\mapsto f^*h$ is infinitesimally invertible on the space of free immersions provided $q \geq n+n(n+1)/2$, where h is the standard Riemannian metric on $\mathbb R^q$.
This leaves out the range $n(n+1)/2<q<n+n(n+1)/2$ in which the system is still underdetermined. Gromov conjectured that the operator is possibly infinitesimally invertible on generic set of maps for $q\geq n(n+1)/2+n-\sqrt{n/2}$ and he also gave an outline of the proof.
We shall mention some recent progress made in that direction.

4) **Yakov Eliashberg**

"From smooth topology to symplectic and back."

ABSTRACT
There are several canonical symplectic geometric constructions which can be performed on smooth manifolds. For instance, the cotangent bundle of a smooth manifold has a canonical symplectic structure, and one can ask whether the symplectomorphism type of the cotangent bundle remembers the smooth topology of the manifold. In the opposite direction any 2n-dimensional symplectic Weinstein manifold (which is the symplectic counterpart of a Stein complex manifold) can be viewed as the cotangent bundle of a possibly singular n-dimensional complex, and one can ask whether symplectic invariants can be described in terms of smooth topology of this complex. I will discuss the interplay between these two directions.

5) **Sylvestre Gallot**

"When are two quasi-isometric manifolds diffeomorphic?"

ABSTRACT
We prove that under suitable assumptions the barycenter map (which will be defined) is a diffeomorphism between two manifolds ϵ-close in Gromov-Hausdorff distance, for a computable number ϵ. We deduce some applications to the isolation of canonical structures (work in progress in collaboration with G. Besson, G. Courtois, and A. Sambusetti).

6) **Riccardo Piergallini**

"Coverings, open books and fibrations"

ABSTRACT
In the early eighties J. Harer proved that all the open book decompositions of the same 3-manifold M can be related by two moves.
The first move is the stabilization by Hopf band plumbing, while the second one, called twisting, has a more involved description and it is related to the Kirby calculus. More recently E. Giroux and N. Goodman showed that only stabilization is really needed if the contact structures associated to the open books belong to the same plane field homology class, in particular when M is a homology sphere. When the 3-manifold M is thought as the boundary of 4-dimensional 2-handlebody H, any open book decomposition on M naturally arises as the boundary restriction of a topological Lefschetz fibration $f: H \to B^2$. Moreover, any such Lefschetz fibration uniquely determines the 4-dimensional 2-handlebody structure of H up to 2-deformations. Any 4-dimensional 2-handlebody H can be represented as a covering of B^4 branched over a ribbon surface F up to certain covering moves. In fact, in this way the Lefschetz fibration structures on H correspond to the realizations of F as a braided surface and the covering moves can be interpreted in terms of two Lefschetz fibration moves via the Rudolph's braiding procedure. The first move is just the 4-dimensional version of the Hopf stabilization, while the second one restricts to a very special case of twisting on the boundary open book. This provides a 4-dimensional version of the Harer's result and a different approach to the open book moves, with a new intepretation of twisting.

7) **Massimiliano Pontecorvo**

"Smooth manifolds with different complex structures"

ABSTRACT
Twistor spaces of self-dual 4-manifolds can admit a different complex structure with rich geometrical properties. We will also discuss the case of Riemannian 4-manifolds admitting more than one Hermitian structure.

8) **Andrea Sambusetti**

"Convergence and finiteness for some classes of spaces with acylindrical splittings."

ABSTRACT
The notion of acylindrical splitting comes from the Bass-Serre theory of groups; one says the a manifold X has a k-acylindrical splitting if its fundamental group splits as an amalgamated product $G=A*_C B$, and the action of G on its Bass-Serre tree has fixed-point subsets of diameter less than k.
A number of interesting classes of compact manifolds admit acylindrical splittings: surfaces and 2-dimensional orbifolds of negative curvature,
graph 3-manifolds and non-geometric 3-manifolds, irreducible higher-dimensional graph manifolds, ramified coverings, Cat(0)-spaces which split over strictly negatively curved subspaces etc.
I will present some finiteness and local topological rigidity results for these spaces under entropy and diameter bounds, without any curvature or injectivity radius assumption (which contrasts with the classical convergence and finiteness theorems in Riemannnian geometry, which hold under lower curvature bounds).
If time allows, I will also discuss a convergence theorem for negatively curved metrics on these spaces. (Joint work with Filippo Cerocchi)