Complex Geometry in Merida - Alberto 80

Complex Geometry in Merida: A Celebration of Alberto Verjovsky's 80th Birthday,

Will be held on January 8-14, 2023 in Mérida, Mexico, at the UADY building. The conference schedule is included below.

The talks will be held at the UADY building. There is an excellent coffee place across the street from the conference venue at the Hotel Mérida Yucatán.

https://goo.gl/maps/zxW8w4HLv72YPiSX6

Please note that the **conference hotel is the Gamma Mérida el Castellano.**

https://goo.gl/maps/cBx6TV5jJg4tQtCZ6

Organizers: Laurent Meersseman, Ernesto Lupercio, Jospe Seade, Gerónimo Uribe, Waldemar Barrera.

SPEAKERS
Bertrand Deroin
Andrés Navas
Laurent Meersseman
Juan Manuel Burgos
Angel Cano
Eleonora Di Nezza
Sorin Dumitrescu
Gabriela Hinojosa Palafox
Ludmil Katzarkov
Santiago López de

Medrano
Kyoung Seog Lee
Aubin Arroyo
Adolfo Guillot
Erwan Rosseau
Hugo García Compean
PARTICIPANTS
Enrique Becerra
Waldemar Barrera
Juan Pablo Navarrete
Miguel Xicotencatl
Ernesto Lupercio
Alberto Verjovsky

Conference Schedule:

	Jan 9, Monday	**Jan 10**	**Jan 11**	**Jan 12**	**Jan 13**
9:30 - 10:30	**Deroin I**	**Meersseman I**	**Navas II**	**Deroin III**	**Navas III**
11 - 12	**Navas I**	**Deroin II**	**Meersseman II**	**Meersseman III**	**Katzarkov**
12:30 - 13:30	**Burgos**	**Di Nezza**	**Dumitrescu**	**Rosseau**	**Guillot**
13:30 - 15:00	**Recess**	**Recess**	**Recess**	**Recess**	
15:30 - 16:30	**Cano**	**García-Compean**		**López de Medrano**	
17 - 18	**Hinojosa**	**Lee**		**Arroyo**	

Bertrand Deroin (Cergy Université): *The dichotomy structural stability/bifurcations in moduli spaces of holomorphic foliations on surfaces.*

In these lectures, I will report on: the history of the problem, Hudai-Verenov and Ilyashenko's rigidity theorems and their descendants, the case of Riccati equations and their relations with Kleinian groups, and finally discuss some new examples of non linear structurally stable foliations on the complex projective plane.

Eleonora Di Nezza (Sorbonne Université): *"Families of Kähler-Einstein metrics"*

We study families of singular Kähler-Einstein metrics. We develop the first steps of pluripotential theory in family in order to obtain an explicit control of the C^0 estimate even if the complex structure changes. We can then treat several geometric context such as families of general type varieties and families of Calabi-Yau varieties: We show that the potential of a (singular) Kähler-Einstein metric on the generic fibre converges to the one in the central fibre.

Sorin Dumitrescu (Université Côte d'Azur): *"Holomorphic* $\mathrm{sl}(2,\mathbf{C})$*–differential systems on compact Riemann surfaces and curves in compact quotients of* $\mathrm{SL}(2,\mathbf{C})$*"*

We explain the strategy of a recent result that constructs holomorphic $\mathrm{sl}(2,\mathbf{C})$–differential systems over some Riemann surfaces Σ_g of genus $g \geq 2$, such that the image of the associated monodromy homomorphism is some cocompact Kleinian subgroup $\Gamma \subset \mathrm{SL}(2,\mathbf{C})$. As a consequence, there exist holomorphic maps from Σ_g to the quotient $\mathrm{SL}(2,\mathbf{C})/\Gamma$, that do not factor through any elliptic curve. This answers positively a question asked by Huckleberry and Winkelmann, also raised by Ghys.

This is a joint work with Indranil Biswas (TIFR, Mumbai), Lynn Heller (BIMSA, Beijing) and Sebastian Heller (BIMSA, Beijing).

Laurent Meersseman (Université d'Angers): *"Moduli Stacks in Complex Analytic Geometry"*

We explain how stack theory can be used in Complex Analytic Geometry to go beyond the classical local deformation theory of Kodaira-Spencer and Kuranishi and to deal with global moduli problems. After recalling the basic notions of families, deformations and the main theorems on the existence of a semi-universal deformation, we introduce the Teichmüller and moduli stacks as a natural setting to globalize the questions. Then we go back to a local point of view and study the local structure of the Teichmüller stack, especially in the Kähler case.

Erwan Rousseau (Université de Brest): *"Numerically nonspecial varieties"*

Campana introduced the class of special varieties as the varieties admitting no Bogomolov sheaves i.e. rank one coherent subsheaves of maximal Kodaira dimension in some exterior power of the cotangent bundle. Those are precisely varieties which do not admit any surjective map onto a general type orbifold. Campana raised the question if one can replace the Kodaira dimension by the numerical dimension in this characterization. We answer partially this question showing that a projective manifold admitting a rank one coherent subsheaf of the cotangent bundle with numerical dimension 1 is not special. We also establish the analytic characterization with the non-existence of Zariski dense entire curve and the arithmetic version with non-potential density in the function field setting (joint work with Frédéric Touzet and Jorge Pereira).

Ángel Cano (UNAM) *Knot groups representations into matrix groups via Gram-Schmidt.*

In this talk we propose a computacional method to calculate matrix representations of Knot fundamental groups. Joint work with Ángel Rodríguez a Patricia Domínguez.

Hugo García Compean (Cinvestav) *A Perturbative Approach to Average Asymptotic Invariants for Knots and Links*

The perturbative expansion of Chern–Simons gauge theory leads
to invariants of knots and links, the so-called finite type invariants or Vassiliev invariants. It has been proved that at any order in perturbation theory the superposition of certain amplitudes is an invariant of that order. Bott–Taubes integrals on configuration spaces are introduced in the present context to write Feynman diagrams at a given order in perturbation theory in a geometrical and topological framework. One of the consequences of
this formalism is that the resulting amplitudes are rewritten in cohomological terms in configuration spaces. This cohomological structure can be used to translate Bott–Taubes integrals into Chern–Simons perturbative amplitudes and vice versa. In this talk,
this program is performed up to third order in the coupling constant.
Finally we take advantage of these results to incorporate in the formalism a smooth and divergenceless vector field on the 3-manifold.
The Bott–Taubes integrals obtained are used for constructing higher-order
average asymptotic Vassiliev invariants extending the work of Komendarczyk and Volić.

Gabriela Hinojosa (UAEM) *Hausdorff dimension of equivalent dynamically defined wild knots.*

Let T be a pearl necklace consisting of the union of n consecutive tangent closed 3-balls Bi (i=1,2,..., n) and consider the Kleinian group ΓT generated by the reflections on the boundaries ∂Bi. Let Λ(ΓT) be a wild knot obtained as the limit set of ΓT acting on the 3-sphere S3. We say that a n-pearl necklace V consisting of the union of consecutive tangent closed 3-balls Ci (i=1,2,..., n) is equivalent to T if there exists a homeomorphism φ:S3→S3 such that φ (V)=T, φ(Ci)=Bi, and φ (Ci∩Ci+1)=Bi∩Bi+1. In this talk we will study the Hausdorff dimension of Λ(ΓT) for equivalent pearl necklaces.

Adolfo Guillot (UNAM) *Foliated affine and projective structures*

We will consider affine and projective structures defined along the leaves of holomorphic foliations by curves on compact complex manifolds which vary holomorphically in the transverse direction, and we will exhibit many foliations that admit such structures. We will present an index theorem relating local invariants of the foliated structure to topological data of the foliation and the ambient manifold. This result implies that some foliations (for instance, Kodaira fibrations) do not admit such structures. Joint work with Bertrand Deroin.

Santiago López de Medrano (Imate, UNAM) *On singularities of intersections of concentric ellipsoids in* R^n

We will briefly recall what is known about the topology of intersections of concentric ellipsoids in $\R^n$, starting with the intersections of two of them. We will present some new singular examples and their smoothings. In some cases we will also consider the corresponding associated moment-angle manifolds that admit complex structures in the smooth case.

This is joint work with Enrique Artal and María Teresa Lozano from the University of Zaragoza, Spain.