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Meeting

Progressi Recenti in Geometria Reale e Complessa - IX

Levico Terme (Trento) – 19-23 ottobre 2014

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Web-page: http://www.science.unitn.it/cirm/GeometriaReale2014.html

BOOK OF ABSTRACTS /

SEMINARI

Complex Finsler structures on tensor products

INES ADOUANI

Université Paris Jussieu (France)

Given two holomorphic vector bundles E_1 and E_2 respectively endowed with two Finsler structures F_1 and F_2, Kobayashi asks about the existence of natural complex Finsler structures on tensor product $E_1 \otimes E_2$ involving the Finsler structure on E_1 and E_2. A positive answer to this question permit us to study the curvature of $E_1 \otimes E_2$ and to give an analogue to the theorem of Hartshorne treating the negativity of $E_1 \otimes E_2$. In this talk, I will give an answer to Kobayashi question after review some concepts in complex Finsler geometry and fundamentals theorems dealing with the negativity of holomorphic vector bundle.

Funzioni quaternioniche slice-regolari che non si estendono a R

AMEDEO ALTAVILLA

Università di Trento

In questo seminario mostrerò con esempi e applicazioni geometriche come la teoria delle funzioni slice regolari sui quaternioni si estende al caso in cui il dominio di definizione non abbia punti reali.

Non-Kähler metrics and cohomologies on complex manifolds

DANIELE ANGELLA

Università di Parma

We investigate the geometry of non-Kähler manifolds from both the metric and the cohomological point of view. In particular, we study the existence of special metrics on complex manifolds in connection with cohomological properties.

(With the fundamental contribution of: A. Tomassini, S. Calamai, H. Kasuya, G. Dloussky, C. Spotti, L. Ugarte, A. Latorre, F. A. Rossi, M. G. Franzini.)

A Poincaré-Bendixson theorem for meromorphic connections on Riemann surfaces

FABRIZIO BIANCHI

Tolouse (France)

One of the main open problems in local dynamics of several complex variables is the understanding of the dynamics of holomorphic germs tangent to the identity in a full neighbourhood of the origin. Following the work of M. Abate, F. Bracci and F. Tovena, I shall explain how this problem naturally leads to studying the geodesics for a meromorphic connection on the leaves of some foliation in Riemann surfaces of a projective space and then present a theorem describing the asymptotic behaviour of such geodesics. This is a joint work with Marco Abate.

A spectra comparison theorem

FILIPPO CEROCCHI

Centro De Giorgi, Pisa

We shall show an approximation result for the spectrum of a compact Riemannian manifold (Y, g) which admits a continuous GH-approximation of non-zero absolute degree onto a reference manifold (X, g_0) of "bounded geometry", and whose volume is almost smaller than the one of (X, g_0).

On the curvature of conic Kaehler-Einstein metrics

ALBERTO DELLA VEDOVA

Università di Milano Bicocca

Kaehler metrics with cone singularities along a divisor turned out to be a fundamental tool in studying the existence problem of Kaehler-Einstein metrics on Fano manifolds. In this talk we discuss Riemannian curvature of conic Kaehler metrics and we give sufficient conditions for its boundedness. Presented results come from a joint work with C. Arezzo and G. La Nave.

Curve razionali nella grassmanniana schematica

GENNARO DI BRINO

Université du Luxembourg

In questa comunicazione, presenteremo una possibile costruzione dello spazio delle mappe razionali da $\mathbb{P}^1_{\mathbb{C}}$ alla grassmanniana $Grass_r(V)$, dei quozienti di dimensione r di uno spazio vettoriale V di dimensione infinita. Più in dettaglio, mostreremo che tali mappe formano naturalmente un sottoschema aperto dello schema $Quot$ del fibrato vettoriale banale infinito $\mathcal{O}_{\mathbb{P}^1}^{\oplus \infty}$. Se ce ne sarà il tempo, andremo più a fondo nelle possibili applicazioni e generalizzazioni.

Local regularity for singular solutions of degenerate complex Monge-Ampere equations

ELEONORA DI NEZZA

Imperial College London (UK)

Let X be a compact Kaehler manifold and D a closed subset of X with respect to the standard topology. We study regularity of solutions of complex Monge-Ampere equations with the right hand side that degenerates along D. We establish uniform a priori estimates which generalize both Yaus and Kolodziejs celebrated estimates in order to show local regularity on $X\Delta$. Moreover, when D is a divisor, we study the asymptotic behavior of the solution near the divisor. This is a joint work with Chinh Lu (Chalmers University of Technology).

Coppie mirror-simmetriche di threefold di Calabi-Yau con altezza bassa

FILIPPO FRANCESCO FAVALE

CIRM - Fondazione Bruno Kessler, Trento

La famiglia dei threefold di Calabi-Yau ha la particolarità di essere chiusa per quozienti liberi e finiti. Inoltre, le varietà costruite con questo procedimento hanno spesso proprietà che ne rendono lo studio interessante. Dato un fourfold di Fano X, un modo per costruire simili quozienti é quello di considerare una coppia ammissibile in X, cioé una coppia (Y, G) dove G é un gruppo finito di automorfismi di X e Y é un divisore liscio anticanonico $G-$invariante su cui l'azione di G é libera. Nel corso del seminario parlerò di coppie ammissibili nel prodotto di due superfici di del Pezzo e di alcune varietà di Calabi-Yau che si possono costruire come quozienti associati a coppie ammissibili. Analizzerò in particolare il caso di $(\P^1)^4$, caso in cui classificherò le possibili coppie ammissibili e mostrerò come, per alcuni dei quozienti associati, si possa costruire una Hodge-theoretic mirror che é quoziente associato a una coppia ammissibile in un altro Fano fourfold.

La matrice delle bitangenti di una quartica piana

ALESSIO FIORENTINO

Università di Roma "La Sapienza"

E' stato dimostrato nel 2003 da Caporaso e Sernesi che una quartica piana univocamente determinata dalla configurazione delle sue 28 bitangenti. In un articolo del 2011 Plaumann, Sturmfels e Vinzant costruiscono esplicitamente a partire da un risultato classico di Hesse una matrice 8X8 che parametrizza le 28 bitangenti di una quartica piana non singolare. Come risultato di un lavoro scritto in collaborazione con Dalla Piazza e Salvati Manni, si illustrer come esprimere tale matrice in termini di gradienti di funzioni theta di Riemann. Risulterà, in particolare, ricavabile da tale espressione una già nota rappresentazione determinantale della cuva in termini di gradienti di funzioni theta.

Quasiconformal extentions via the chordal Loewner equation

PAVEL GUMENYK

Università di Roma "Tor Vergata"

Joint work with Ikkei Hotta (Tokyo Institute of Technology, Japan).

Univalent (i.e. injective holomorphic) functions with quasiconformal extentions play an important role in the theory of quasiconformal maps and, in particular, in the Teichmller Theory. The Loewner differential equation, known also as the Loewner Kufarev equation or the radial Loewner equation, describes the general form of a continuous non-autonomous holomorphic dynamics in the disk with a fixed point at the origin. In this way it provides a number of criteria for a holomorphic function in the unit disk to be univalent. In 1972, J. Becker found a method to construct quasiconformal extentions of such functions to the whole Riemann sphere using the Loewner equation. In the present work in progress we suggest a construction of quasiconformal extentions based on the chordal Loewner equation, which describes the dynamics with an attracting fixed point (aka Denjoy Wolff point) at the boundary. As a result we obtain several sufficient conditions for quasiconformal extendibility, which are new, up to our best knowledge.

Some aspects of potential theory on complete manifolds with boundary and applications to controlled mean curvature graphs

DEBORA IMPERA

Università di Milano Bicocca

The aim of the talk is to discuss some aspects of the notion of parabolicity in the setting of manifolds with boundary. In particular we will show how this property can be characterized in terms of a new form of the classical Ahlfors maximum principle, involving weak sub-harmonic functions with Neumann boundary conditions. The motivation underlying this study is the attempt to obtain new information on the geometry of graphs or, more generally, of hypersurfaces with boundary and prescribed mean curvature inside Riemannian products.

This is a joint work with S. Pigola and A. G. Setti.

Complex nilmanifolds and their cohomological decomposition

ADELA LATORRE

Universidad de Zaragoza (Spain)

Given a differential manifold M, the existence of a complex structure induces a bigraduation in the space of differential forms. Therefore, one would like to study when this decomposition moves to cohomology. This is already known when M is Kähler, due to the Hodge decomposition theorem, and also when its dimension is 4, as proved by Draghici, Li, and Zhang. In this talk, we will recall some recent results about the topic and present our contribution to it, based on the behaviour of 6-dimensional nilmanifolds.

A Kummer-type construction for Kahler orbifolds with constant scalar curvature

RICCARDO LENA

Università di Parma

In this talk we illustrate a Kummer-type construction for Kahler orbifolds with constant scalar curvature. We start with a Kahler orbifold with constant scalar curvature and isolated singularities of particular kind and, via a gluing procedure, we construct a desingularization (total or partial) that also carries a Kahler metric of constant scalar curvature.

Classificazione delle superfici debolmente complete

SAMUELE MONGODI

Università di Roma Tor Vergata

(Work in progress) In questo lavoro, in collaborazione con G. Tomassini e Z. Slodkowski, ci proponiamo lo scopo di fornire una classificazione delle superfici complesse (varietà complesse di dimensione 2) debolmente complete, ovvero che possiedono una funzione di esaustione plurisubarmonica; comincerò fornendo alcuni esempi di tali superfici (oltre ovviamente agli spazi di Stein) ed esaminando nel dettaglio le loro caratteristiche geometriche, per poi passare a delineare la strategia di dimostrazione e gli strumenti principali impiegati.

On minimal Legendrian submanifolds of Sasaki-Einstein manifolds

DAVID PETRECCA

Università di Pisa

For a minimal Legendrian submanifold L of a Sasaki-Einstein manifold, we will prove that certain families of functions are eigenfunctions of the Laplacian of L together with a lower bound for the multiplicity of the relative eigenvalue. If this lower bound is attained we prove that L is totally geodesic and a rigidity result about the ambient manifold. This is a generalization of a result of Le-Wang for the standard Sasakian sphere. This is a joint work with S. Calamai.

Complete self-shrinkers confined into some regions of the space

MICHELE RIMOLDI

Università di Milano Bicocca

We study geometric properties of complete non-compact bounded self-shrinkers for the mean curvature flow and obtain natural restrictions that force these hypersurfaces to be compact. Furthermore, we observe that, to a certain extent, complete self-shrinkers intersect transversally a hyperplane through the origin. When such an intersection is compact, we deduce spectral information on the natural drifted Laplacian associated to the self-shrinker. These results go in the direction of verifying the validity of a conjecture by H.D. Cao concerning the polynomial volume growth of complete self-shrinkers. A finite strong maximum principle in case the self-shrinker is confined into a cylindrical product is also presented. This is a joint work with S. Pigola.

Metriche invarianti associate allo spazio di Hardy quaternionico

GIULIA SARFATTI

Università di Bologna

Lo spazio di Hardy quaternionico H^2 e' uno spazio di Hilbert dotato di un nucleo riproducente. In questo seminario vedremo come questa proprieta' possa essere utilizzata per costruire una metrica Riemanniana sulla palla unitaria quaternionica B e studieremo la geometria derivante da questa costruzione. Vedremo inoltre che, in contrasto con l'esempio della metrica di Poincare' sul disco complesso, non esiste una metrica Riemanniana su B che sia invariante rispetto alle trasformazioni di Moebius regolari. Lavoro in collaborazione con Nicola Arcozzi.

On moduli spaces of KE Q-Fano varieties in two and higher dimension

CRISTIANO SPOTTI

DPMMS, University of Cambridge (UK)

It is expected that the set of Kahler-Einstein / K-polystable Q-Fano varieties forms relatively nice "compact moduli spaces". In the talk I will discuss the construction of explicit examples, showing the relations with the notion of "good moduli spaces for Artin stacks" introduced by Jarod Alper, and I will describe some preliminary, but more general, results in arbitrary dimension based on analytic techniques and focused on the structure of the moduli near singular varieties (on-going project with Song Sun and Chengjian Yao).

On the coefficients of the TYZ expansion of Kaehler manifolds

Michela Zedda

Università di Torino

In this seminar we study the elliptic PDEs associated to the coefficients of the TYZ expansion of the Kempft distorsion function. In particular, we describe some recent results about the lower order terms of this expansion.