Centro Internazionale per la Ricerca Matematica (C.I.R.M.), Trento
G.N.S.A.G.A.-I.N.d.A.M.
Dipartimento di Matematica, Politecnico di Torino
Dipartimento di Matematica, Università di Torino

ABSTRACTS BOOKLET

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LIST OF PARTICIPANTS

Daniele ALESSANDRINI Dipartimento di Matematica, Università di Pisa, Largo Bruno Pontecorvo 5, 56127 Pisa, (Italy). daniele.alessandrini@gmail.com
Lars ALLERMANN Fachbereich Mathematik, Technische Universitt Kaiserslautern, Postfach 3049, D-67653 Kaiserslautern, (Germany). allerman@mathematik.uni-kl.de
Marco ANDREATTA Dipartimento di Matematica, Università di Trento, via Sommarive 14, 38050 Povo (Trento), (Italy). andreatt@science.unitn.it
Edoardo BALLICO Dipartimento di Matematica, Università di Trento, via Sommarive 14, 38050 Povo (Trento), (Italy). ballico@science.unitn.it
Ingrid BAUER Mathematisches Institut, Universität Bayreuth, Universitätsstrasse 30, D-95447 Bayreuth, (Germany). Ingrid.Bauer@uni-bayreuth.de
Cristiano BOCCI Dipartimento di Matematica, Università di Milano, via Cesare Saldini 50, 20133 Milano, (Italy). cristiano.bocci@unimi.it
Ada BORALEVI Dipartimento di Matematica, Università di Firenze, Viale Morgagni 67/A, 50134 Firenze, (Italy). boralevi@math.unifi.it
Chiara BRAMBILLA Dipartimento di Matematica, Università di Firenze, Viale Morgagni 67/A, 50134 Firenze, (Italy). brambilla@math.unifi.it
Alberto CALABRI Dipartimento di Matematica, Università di Padova, Via Trieste 63, 35121 Padova, (Italy). calabri@dmsa.unipd.it
Gianfranco CASNATI Dipartimento di Matematica, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, (Italy). casnati@calvino.polito.it
Fabrizio CATANESE Mathematisches Institut, Universität Bayreuth, Universitätsstrasse 30, D-95447 Bayreuth, (Germany). Fabrizio.Catanese@uni-bayreuth.de
Luca CHIANTINI Dipartimento di Scienze Matematiche ed Informatiche, Università di Siena, Pian dei Mantellini 44, 53100 Siena, (Italy). chiantini@unisi.it
Alan CIGOLI Dipartimento di Matematica, Università di Milano, via Cesare Saldini 50, 20133 Milano, (Italy). cigoli@mat.unimi.it
Ciro CILIBERTO Dipartimento di Matematica, Università "Tor Vergata", via della Ricerca Scientifica 1, 00133 Roma, (Italy). cilibert@mat.uniroma2.it
Pietro DE POI Dipartimento di Matematica e Informatica, Università di Trieste, via Alfonso Valerio 12/1, 34127 Trieste, (Italy). depoi@dmi.units.it
Ariana DUNDON Department of Mathematics, University of Washington, Box 354350, Seattle, WA 98195-4350, (USA). adundon@math.washington.edu
Claudio FONTANARI Dipartimento di Matematica, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, (Italy). fontanari@calvino.polito.it
Michael FRIEDMAN Department of Mathematics and Computer Science, Bar Ilan University, Ramat Gan 52900, (Israel). fridmam@macs.biu.ac.il
Concettina GALATI Dipartimento di Matematica, Università della Calabria, Ponte Attrezzato P. Bucci, 87036 Arcavacata di Rende (CS), (Italy). galati@mat.unical.it
Sergey GALKIN Steklov Mathematical Institute, Gubkin str. 8, 119991 Moscow, (Russia). galkin@mi.ras.ru
Sukmoon HUH , Institut für Mathematik, Universität Zürich, Winterthurerstrasse 190, CH-8057 Zürich, (Switzerland). sukmoon.huh@math.unizh.ch
Donatella IACONO SISSA-ISAS, via Beirut 4, 34014 Trieste, (Italy). iacono@sissa.it

Paltin IONESCU Department of Complex Geometry, Topology, Faculty of Mathematics and Computer Science, University of Bucharest, Str. Academiei 14, 70109 Bucharest, (Romania). Paltin.Ionescu@imar.ro
Antonio KIRSON Department of Mathematics, University of Washington, Box 354350, Seattle, WA 98195-4350, (USA). aakirson@math.washington.edu
Antonio LANTERI Dipartimento di Matematica "F. Enriques", Università di Milano, Via Cesare Saldini 50, 20133 Milano, (Italy). antonio.lanteri@mat.unimi.it
Elena MARTINENGO Dipartimento di Matematica, Università "La Sapienza", P.zale A. Moro 2, 00185 Roma, (Italy). martinen@mat.uniroma1.it
Massimiliano MELLA Dipartimento di Matematica, Università di Ferrara, via Machiavelli 35, 44100 Ferrara, (Italy). mll@unife.it
Emilia MEZZETTI Dipartimento di Matematica e Informatica, Università di Trieste, via Alfonso Valerio 12/1, 34127 Trieste, (Italy). mezzette@units.it
Michele NESCI Dipartimento di Matematica, Università di Roma III, Largo San Leonardo Murialdo 1, 00146 Roma, (Italy). nesci@mat.uniroma3.it
Atsushi NOMA Department of Mathematics, Faculty of Education and Human Sciences, Yokohama National University, 79-2 Tokiwadai, Hodogaya, Yokohama 240-8501, (Japan). noma@edhs.ynu.ac.jp
Roberto NOTARI Dipartimento di Matematica, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, (Italy). roberto.notari@polito.it
Carla NOVELLI Dipartimento di Matematica, Università di Genova, via Dodecaneso 35, 16146 Genova, (Italy). novelli@dima.unige.it
Ignacio OJEDA Department of Mathematics, University of Extramadura, Avenida de Elvas s/n, 06071 Badajoz, (Spain). ojedamc@unex.es
Eleonora PALMIERI Dipartimento di Matematica, Università di Roma III, Largo San Leonardo Murialdo 1, 00146 Roma, (Italy). palmieri@mat.uniroma3.it
Valentina PATERNO Dipartimento di Matematica, Università di Trento, via Sommarive 14, 38050 Povo (Trento), (Italy). paterno@science.unitn.it
Elena POLASTRI Dipartimento di Matematica, Università di Ferrara, via Machiavelli 35, 44100 Ferrara, (Italy). plslne@unife.it
Francesco POLIZZI Dipartimento di Matematica, Università della Calabria, Ponte Attrezzato P. Bucci, 87036 Arcavacata di Rende (CS), (Italy). polizzi@mat.unical.it
Juan Francisco PONS LLOPIS Departament dAlgebra I Geometria, Universitat de Barcelona, Gran via de les Corts Catalanes 585, 08007 - Barcelona, (Spain). jfpons@ub.edu
Elisa POSTINGHEL Dipartimento di Matematica, Università di Roma III, Largo San Leonardo Murialdo 1, 00146 Roma, (Italy). postingh@mat.uniroma3.it
Francesco PRANTIL Dipartimento di Matematica, Università di Trento, via Sommarive 14, 38050 Povo (Trento), (Italy). prantil@science.unitn.it
Kristian RANESTAD Department of Mathematics, PB 1053 Blindern, 0316 Oslo, (Norway). ranestad@math.uio.no
Johannes RAU Fachbereich Mathematik, Technische Universitt Kaiserslautern, Postfach 3049, D-67653 Kaiserslautern, (Germany). johannes-rau@gmx.de
Flavia REPETTO Dipartimento di Matematica "F. Enriques", Università di Milano, Via Cesare Saldini 50, 20133 Milano, (Italy). flaviarepetto@yahoo.it
Francesco RUSSO Departamento de Matematica, Universidade Federal de Pernambuco, Cidade Universitaria, 50670-901 Recife - PE, (Brazil). frusso@superig.com.br
Anna SCARAMUZZA Dipartimento di Matematica e Informatica, Università di Trieste, via Alfonso Valerio 12/1, 34127 Trieste, (Italy). scaramuz@mathsun1.units.it

Jose Carlos SIERRA Facultad de Ciencias Matemáticas, Universidad Complutense de Madrid, Plaza de Ciencias 3, 28040 Madrid, (Spain). jcsierra@mat.ucm.es
Alessandra TRAMBAIOLLI Dipartimento di Matematica, Università di Ferrara, via Machiavelli 35, 44100 Ferrara, (Italy). trmlsn@unife.it

Marco Andreatta: **On Fano manifolds**

Fano manifolds are special projective varieties, discovered and studied long ago by the Italian mathematician Gino Fano, which in recent time, thank to their many important features, have become central blocks in different aspect of geometry. This happened in particular in the so called Minimal Model Program or Mori theory. I will present some recent results on Fano manifolds in the frame of Mori theory, either connected to a long standing conjecture of S. Mukai or to classification problems.

Cristiano Bocci: **A tropical interpretation of m-dissimilarity maps**

In this work we give an answer to the Sturmfels' question in "Tropical mathematics": find the tropical equations of the image of the tropical grassmannian G_2, n under the m-weight map ψ^m for $m = 3$. The element in the image of ϕ^m are called m-dissimilarity map and are a generalizations of metrics on trees. It is known that G_2, n parametrizes all metric trees (in Phylogenetics) with n leaves, i.e. trees with pairwise distances between different taxa on the leaves. For such taxa, and especially for $m = 3$ it can be more reliable statistically to estimate the triple weights rather than the pairwise distances. Successively we pass to analyze the case $m >= 4$. Here the situation is more complicated since the m-weight maps are not given by tropical monomials. We first give a description of these maps by rational tropical polynomial and then we give some result of contaiment which permit us to give a partial answer to the question of Yoshida about the characterization of m-dissimilarity maps via plucker relations.

This is joint work with Filip Cools.

Chiara Brambilla: **Secant varieties and polynomial interpolation**

Polynomial interpolation problems in projective spaces consist in computing the dimension of linear systems of hypersurfaces of degree d in P^n with prescribed singularities of fixed multiplicity. Such problems have been widely studied. They are linked to the problem of Waring for polynomials and to the study of higher secant varieties of projective varieties.

A fundamental result in this context is the theorem of Alexander and Hirschowitz, concerning the case in which all the singularities are double points.

In my communication I will discuss some aspects of the techniques used in the proof of the theorem of Alexander and Hirschowitz, and I will give some generalizations and applications. This is joint work with Giorgio Ottaviani.

Fabrizio Catanese: **Lines on the general point of a projective variety**

Landsberg showed that if a projective variety X of dimension n has the property that through the general point x of X there passes a finite number m of lines, then m is at most $n!$. Since equality holds for a hypersurface of degree n such that the singular locus has codimension at least 3, one is lead to conjecture that $m = n!$ is a characterization of these hypersurfaces. This is proven for $n = 2, 3$ and we shall describe an approach and partial results towards the solution of the conjecture in all dimensions.

Luca Chiantini: **Groups of points and the representation of hypersurfaces**

We present some results in the investigation of groups of points on hypersurfaces, which are connected to the matricial representation of forms and also to the study of some natural secant varieties.

Pietro De Poi: **On quadratic normality for threefolds in $\mathbb{P}^5$**

A well-known conjecture of Peskine-Van de Ven asserts that smooth threefolds $X \subset \mathbb{P}^5$ are quadratically normal with the only exception of the Palatini scroll. I will show that one cannot drop the request that X is smooth, by exhibiting two families of locally Cohen-Macaulay threefolds in $\mathbb{P}^5$ not quadratically normal, and moreover I will present the following result, which is somehow related to the previous conjecture: If $X \subset \mathbb{P}^5$ is not quadratically normal, then its triple curve is reducible.

Donatella Iacono: **Differential graded Lie algebras and deformations of holomorphic maps**

We study infinitesimal deformations of holomorphic maps of compact complex manifolds, using the deformation functor associated with a pair of morphisms of differential graded Lie algebras. In particular, in the case of Kähler manifolds, we describe a generalization of the semiregularity map.

Paltin Ionescu: **On manifolds covered by lines**

Projective manifolds covered by lines have been intensively studied by classical geometers. Modern methods coming from "Mori Theory" turned out to be very useful for understanding their structure. In particular, we expect manifolds covered by lines to be fibered, with general fiber a Fano manifold having cyclic Picard group. This is known to be true when the dimension of the family of lines passing through the general point is big enough. Moreover, the study of the variety of lines passing through the general point turns out to be the key for understanding the structure of manifolds covered by lines. Interesting applications include manifolds of "small degree", manifolds covered by "high dimensional linear spaces or hyperquadrics", dual defective and special secant defective manifolds. My talk, based on recent work with Mauro C. Beltrametti and Francesco Russo, will survey the above facts.

Antonio Lanteri: **Inflectional loci of scrolls**

I will report on a recent result obtained with Raquel Mallavibarrena and Ragni Piene. Let $X \subset \mathbb{P}^N$ be a scroll over a smooth curve C and let L be its hyperplane bundle. The special geometry of X implies that certain sheaves related to the principal part bundles of L are locally free. The inflectional loci of X can be expressed in terms of these sheaves, leading to explicit formulas for their cohomology classes. In particular these formulas imply that the only uninflected scrolls in projective spaces of appropriate dimensions are the balanced rational normal scrolls. This extends results due to Shifrin and Piene–Tai in the setting of surface scrolls. Some related results will be also discussed.

Massimiliano Mella: **Cremona group and projective geometry**

I will try to convince the audience that the Cremona group is really huge and that maybe one can find rationality criteria out of this bigness.

Atsushi Noma: **Hypersurfaces cutting out a projective variety**

Let X be a nondegenerate projective variety of degree d and codimension e in the projective space $\mathbb{P}^N$ defined over an algebraically closed field of characteristic zero. We study the following two problems and give partial answers: Is the length of the intersection of X and a line $L \not\subseteq X$ in

$\mathbb{P}^N$ at most $d-e+1$? Is the scheme-theoretic intersection of all hypersurfaces of degree $\leq d-e+1$ containing X equal to X? For the second problem, we study the locus of points from which X is projected non-birationally.

Francesco Polizzi: **The classification of surfaces with $p_g = q = 1$ isogenous to a product of curves**

A projective surface S is said to be isogenous to a product if there exist two smooth curves C, F and a finite group G acting freely on $C \times F$ so that $S = (C \times F)/G$. In this talk we show how to classify all surfaces with $p_g = q = 1$ which are isogenous to a product.

This is a joint work with G. Carnovale (Universita' di Padova).

Kristian Ranestad: **The algebraic degree in semidefinite programming and varieties of symmetric matrices**

The algebraic degree in semidefinite programming is computed as the degree of the dual of a variety of symmetric matrices. In the talk I will explain the connection, and give a simple formula for the degree.