GIORNATE COMMUTATIVE A TORINO

un incontro in onore dei 70 anni di

Silvio Greco

Politecnico di Torino, 11-13 Aprile 2011

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Rüdiger Achilles

Università di Bologna

(Aula Buzano, Monday, April 11, 2011, 17:55–18:15)

Self-Intersections of Curves and the Degree of their Secant Varieties

The talk is based on joint work with M. Manaresi and P. Schenzel. Using the Stückrad-Vogel self-intersection cycle of a curve in projective space, we obtain a formula which relates the degree of the secant variety, the degree and the genus of the curve as well as the self-intersection numbers, the multiplicities and the number of branches of the curve at its singular points. We deduce an expression for the difference between the arithmetic and geometric genus of the curve and illustrate the usefulness of the formulas for computer computations.

David Buchsbaum

Brandeis University

(Aula Buzano, Tuesday, April 12, 2011, 11:00–11:20)

Greco at Brandeis

After some preliminary remarks, we talk about Silvio Greco's stay at Brandeis.

Antonio Campillo

Universidad de Valladolid

(Aula Buzano, Tuesday, April 12, 2011, 15:00–15:45)

Geometry and Poincaré Series

Sets of valuations are often associated to algebraic-geometrical or analytic varieties. They provide filtrations by multi-index on their rings of functions, and those filtrations give rise, in a rather general context, to a multi-variable Poincaré power series. This Poincar series usually encodes the information on those sets of valuations on the variety, and, in the most interesting cases (curves, surfaces, non degenerated hypersurfaces,...) such information is explicitly decoded and proved to be coincident with key geometrical information on the variety (Alexander polynomials, Seiberg-Witten invariants, zeta functions,...). When the variety is embedded and valuations are taken in the ambient space, two different kind of embedded filtrations, and therefore Poincaré series, exist; one geometrical, due to Ebeling and Gussein-Zade, and other algebraic, due to Lemahieu. Again the information can be decoded in interesting cases (curves, Newton filtrations, etc.). Finally, Poincaré series can arise also as limits in a rather general context, and have unexpected applications. We review the results of last ten years, originated in join research with Delgado and Gussein-Zade.

Maria Virginia Catalisano

Università di Genova

(Aula Buzano, Wednesday, April 13, 2011, 10:20–10:40)

Higher Secant Varieties of Segre and Segre-Veronese Varieties

The problem of determining the dimensions of the higher secant varieties of an embedded projective variety has been the object of study by many of the most outstanding geometers of the 19th and 20th centuries. Original investigations mostly concentrated on the secant line variety and were concerned with questions of projection. By counting parameters one finds a natural expected dimension for these varieties, so the question becomes: when is the expected dimension equal to the actual dimension? Varieties which had secant varie- ties of less than the expected dimension were especially interesting and were the object of intense study.

Luca Chiantini

Università di Siena

(Aula Buzano, Tuesday, April 12, 2011, 16:55–17:40)

On the Representation of Polynomials

I will discuss geometrical methods and new results for a canonical description of general homogeneous polynomials, from a combinatorial point of view (determinants, fewnomials, pfaffians, etc.) The problem is linked with the existence of subschemes of some specific types, in general hypersurfaces.

Ciro Ciliberto

Università di Roma Tor Vergata

(Aula Buzano, Tuesday, April 12, 2011, 11:30–12:20)

Stable Maximal Rank Linear Systems on General Rational Surfaces

It is known that the Segre–Harbourne–Gimigliano–Hirschowitz (SHGH) conjecture for linear systems of plane curves with general multiple base points implies Nagata's conjecture. This, in turn, can be expressed as a property of the Mori cone of the blow–up of a plane at ten or more general points. I propose here a rather natural intermediate conjecture, i.e it is implied by the SHGH and implies Nagata. I give some little evidence for it, by showing that the property it predicts holds in fact for some linear systems on the blow–up of a plane at ten or more general points. This is based on joint work in progress with B. Harbourne, R. Miranda and J. Roé.

Roberta Di Gennaro

Università di Napoli

(Aula Buzano, Tuesday, April 12, 2011, 09:30–9:50)

Liaison and Cohen-Macaulayness conditions

In this talk I will quickly review some occurrences of Liaison and Cohen-Macaulayness conditions in the geometry of algebraic curves.

Salvatore Giuffrida

Università di Catania

(Aula Buzano, Tuesday,Wednesday, April 13, 2011, 10:25–10:45)

Scheme Theoretic Complete Intersections in $\mathbf{P}^1 \times \mathbf{P}^1$

The zerodimensional subschemes of $Q = \mathbf{P}^1 \times \mathbf{P}^1$ arising as schemetheoretic complete inter- sections of two curves are considered. The main goal is to describe the possible Hilbert functions and to give some information on the graded Betti numbers of such schemes. In some case the graded Betti numbers of such subschemes is determined.

Rosa M. Miró-Roig

Universitat de Barcelona

(Aula Buzano, Monday, April 11, 2011, 16:00–16:45)

The Minimal Resolution Conjecture for Points on a del Pezzo Surface

It is a long-standing problem in Algebraic geometry to determine the Hilbert function of any set Z of distinct points on any projective variety $X \subseteq \mathbf{P}^n$. It is well-known that $H_Z(t) \leq \min\{H_X(t), |Z|\}$ for any t, and that the equality holds if the points are general. A much more subtle question is to find out the exact shape of the minimal free resolution of I_Z. Mustaţă conjectured that the graded Betti numbers had to be as small as possible (when $X = \mathbf{P}^n$, we recover Lorenzini's conjecture).

In my talk, I will give a brief account of the known results around Mustaţă s conjecture and prove it for points on an ACM quasi-minimal surface.
This is joint work with J.F. Pons-Llopis.

Roberto Notari

Politecnico di Milano

(Aula Buzano, Tuesday,Wednesday, April 13, 2011, 10:35–10:55)

On some minimal curves in $\mathbf{P}^3$

We construct minimal curves in the biliaison class of curves with Hartshorne-Rao module $M = R/I(h)$ Artinian Gorenstein module with some constraints, and we prove some geometrical properties of those curves.

Maria Luisa Spreafico

Politecnico di Torino

(Aula Buzano, Tuesday, April 12, 2011, 09:55–10:15)

A construction of ACM curves

We describe a construction of ACM curves in $\mathbf{P}^3$ and we apply it to find ACM curves through a given 0-dimensional scheme.

Carlo Traverso

Università di Pisa

(Aula Buzano, Tuesday, April 12, 2011, 15:55–16:40)

**Multivariate Algebra, Integer Lattices and Error-Correcting Codes:
An algebraist's Adventures in Post-Quantum Cryptography**

ABSTRACT: I will explain how, as a Groebner fan, I became curious of a challenge of the Spectre, and contributed to defeat a quantum threat to destroy the Internet.

TRANSLATION: I will explain my recent research that combines Groebner bases for binomial ideals, integer lattices, and error correction with secret erasures, developing new variants of lattice-based cryptosystems. These, differently from protocols based on factorization, discrete logarithms and elliptic curves, are not broken in polymonmial time by Schor quantum algorithms, and can hence be used to develop signature algorithms that will resist to the development of efficient quantum computers.

Angelo Vistoli

Scuola Normale Superiore, Pisa

(Aula Buzano, Wednsesday, April 13, 2011, 09:30–10:15)

Essential Dimension

The concept of essential dimension has been introduced 15 years ago, and has attracted a lot of attention since then. The essential dimension of an algebraic or algebro-geometric object (e.g., of an algebra, a quadratic form, or an algebraic curve) is the minimal number of independent parameters required to define the underlying structure. In many cases computing the essential dimension is a delicate question, linked with long-standing open problems. I will survey the basic concepts, give some examples, and present recent results due to Reichstein and myself on essential dimension of homogeneous forms.