ALGEBRAIC GEOMETRY DAY GENOVA-NICE

ABSTRACTS OF TALKS

NICE, 25 MAY 2012

• Lucian Bădescu: Seshadri positive submanifolds of polarised manifolds

This is joint work with M. Beltrametti. Let Y be a submanifold of dimension y of a polarized complex manifold (X, A) of dimension $k \geq 2$, with $1 \leq y \leq k-1$. We define and study two positivity conditions on Y in (X, A), called Seshadri A-bigness and (a stronger one) Seshadri A-ampleness. In this way we get the natural generalization of the theory initiated by Paoletti in 1995 (which corresponds to the case $(k, y) = (3, 1)$) and subsequently generalized and completed by Badescu, Beltrametti and Francia in 1996 (regarding curves in a polarized manifold of arbitrary dimension). The theory presented here, which is new even if $y = k - 1$, is motivated by a reasonably large area of examples.

• Arnaud Beauville: Abelian varieties associated to Gaussian lattices

We associate to a unimodular lattice Γ, endowed with an automorphism i of square -1, a principally polarized abelian variety $A_\Gamma = \Gamma_{\mathbb{R}}/\Gamma$. We show that the configuration of i-invariant theta divisors of A_Γ follows a pattern very similar to the classical theory of theta characteristics; as a consequence we find that A_Γ has a high number of vanishing thetanulls. When $\Gamma = E_8$ we recover the 10 vanishing thetanulls of the abelian fourfold discovered by R. Varley.

• Aldo Conca: Koszul algebras and their syzygies

The Koszul complex is perhaps the most important complex in commutative algebra. Its most striking features are its algebra structure, its grade-sensitivity and its relations with syzygies. In a regular local ring or in a polynomial ring the Koszul complex of the maximal (homogeneous) ideal gives a resolution of the residue field. In a non-regular ring the residue field has an infinite resolution (which has also an algebra structure) "containing" the Koszul complex. Koszul algebras are graded algebras whose residue field has a linear resolution. Many classical variertes (Grassmannians, Veronese varieties etc...) have Koszul coordinate rings. For certain homological aspects Koszul algebras behave like polynomial rings, for others properties they behave like complete intersections of quadrics. In the talk I will discuss these features of Koszul algebras, their syzygies and bounds on the regularity of Koszul homology in general with some applications to Veronese varieties and their projections.

• Christian Pauly: Strange duality revisited

We give a new proof of the strange duality of spaces of generalized theta functions obtained by Belkale, Marian-Oprea, as well as by Oudompheng in the parabolic case. In fact, using the identification of the space of generalized theta function with the WZW models of conformal blocks, we extend the genus-0 result, obtained by Nakanishi-Tsuchiya in 1992, to higher genus curves via the sewing procedure. The new ingredient of the proof is an explicit use of the branching rules of the conformal embedding of the affine Lie algebras $sl(r) \times sl(l)$ in $sl(rl)$.

organizers: L. Bădescu and A. Dimca