SPEAKERS FOR PIERRETTEFEST

1. Shreeram S. Abhyankar

Title. *Jacobian Problem Via Newton Polygon*

Abstract. I will show how to use the Newton Polygon for doing the Plane Jacobian Problem for numerous values of the gcd of the degrees of the two polynomials.

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2. Pierre Colmez

Title. *TBA*

Abstract. To be sent

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3. Félix Delgado de la Mata

Title. *Poincaré series and zeta functions for plane curve singularities over finite fields*

Abstract. The order of functions on the irreducible components of a plane curve singularity defines a multi-index filtration on the ring $\mathcal{O}_{\mathbb{C}^2,0}$ of germs of functions of two variables. The Poincaré series of this filtration coincides with the Alexander polynomial of the curve. The definition of this series by using integration with respect to the Euler characteristic over the projectivization of the local ring leads to the computation of the Poincaré series in other geometrical situations.

Recently, J. Moyano has extended in his thesis these ideas to the case of curves defined over perfect fields, in particular over finite fields. In a joint work with him we study the relationship between the zeta function introduced by Stöhr and the Poincaré series. The interpretation of the Stöhr zeta function in terms of integrals with respect to the (generalized) Euler characteristic over suitable subsets of the ring of functions provides the bridge between both subjects.

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4. Jan Denef

Title. *TBA*

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5. Alexandru Dimca

Title. *On the fundamental groups of algebraic varieties*

Abstract. In this talk we plan to survey a number of recent results on the fundamental groups of algebraic varieties obtained by S. Papadima, A. Suciu and the speaker using the characteristic and resonance varieties.

These techniques allow one to decide in some given classes of groups, which are the groups which may occur as the fundamental groups of smooth projective or quasi-projective varieties.

They have also lead to the construction of some interesting varieties whose fundamental groups lack the expected finiteness properties.

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6. Arno van den Essen

Title. *TBA*

Abstract. To be sent

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7. Benedict Gross

Title. *p-adic L-functions and their refinements*

Abstract. Pierrette Cassou-Noguès gave a beautiful construction of p-adic L-functions for ideal class characters of totally real fields, using Shintani's cone decomposition to study special values of partial zeta functions. These L-functions of a p-adic variable s have played an important role in number theory ever since. I will recall the rationality and integrality results needed for the construction of these functions, and survey some conjectures and results on their behavior at the points $s = 1$ and $s = 0$.

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8. Shulim Kaliman

Title. *Algebraic density property of affine algebraic manifolds*

Abstract. A smooth affine algegraic variety has the algebraic density property if the Lie algebra generated by completely integrable algebraic vector fields coincides with the space of all algebraic vector fields. This notion (formally introduced by Varolin but present implicitly in the earlier works of Andersén and Lempert) has beautiful applications in complex analysis such as a counterexample to the analytic version of the AMS theorem. The reason is that for an affine manifold X with this property local phase flows on holomorphically convex compacts can be approximated by global holomorphic automorphisms of X. We show that the algebraic density property holds for a wide class of affine algebraic varieties. In particular, with the exception of the line and complex tori, it is true for any connected linear algebraic group. If X posseses an algebraic volume form ω then X has the algebraic volume density property provided we have the similar equality but for the algebraic fields with the zero ω-divergence (i.e. we are dealing with automorphisms preserving ω). We describe affine algebraic varieties for which we manage to establish the algebraic volume density property.

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9. Anatoly Libgober

Title. *Families of local systems with non vanishing Hodge numbers and applications*

Abstract. Mixed Hodge structure on the cohomology of local systems leads to a multivariable generalization of spectrum. I will discuss joint work with Pierrette Cassou-Noguès on properties of this invariant for the germs of plane curve singularities

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10. Ignacio Luengo

Title. *TBA*

Abstract. To be sent

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11. Leonid Makar-Limanov

Title. *Locally nilpotent derivations on affine domains*

Abstract. In the talk I'll discuss presentation of a locally nilpotent derivations by a Jacobian and related problems.

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12. Masayoshi Miyanishi

Title. *Jacobian conjecture for singular varieties*

Abstract. The Jacobian conjecture can be generalized to a problem asking whether or not an unramified endomorphism of an algebraic variety is an automorphism. There are affirmative and negative results obtained jointly by the speaker, R.V. Gurjar and M. Masuda. This talk concerns the same conjecture for singular varieties, mostly in the dimension two case, which contain the Platonic $\mathbb{C}^*$-surfaces $\mathbb{C}^2$ modulo a small finite group of $\mathrm{GL}(2,\mathbb{C})$.

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13. András Némethi

Title. *Lattice cohomology of links of normal surface singularities*

Abstract. For any negative definite plumbed 3–manifold M we construct from its plumbed graph a graded $\mathbb{Z}[U]$–module. This, for rational homology spheres, conjecturally equals the Heegaard–Floer homology of Ozsváth and Szabó, but it has even more structure. If M is a complex singularity link then the normalized Euler-characteristic can be compared with the analytic invariants. The Seiberg–Witten Invariant Conjecture will be discussed in the light of this new object.

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14. Walter Neumann

Title. *Metric Geometry of Singularities*

Abstract. The talk will give an overview of what is known about the the bilipschitz geometry of isolated surface singularities, with emphasis on recent work of Lev Birbrair, Alexandre Fernandes and myself.

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15. Mutsuo Oka

Title. *Topology of polar weighted homogeneous hypersurfaces*

Abstract. Abstract: Polar weighted homogeneous polynomials is the class of special polynomials of real variables x_i, y_i, $i = 1, \ldots, n$ with $z_i = x_i + \sqrt{-1}\, y_i$ which enjoys a " polar action". In many aspects, their behavior looks like that of complex weighted homogeneous polynomials. We study basic properties of hypersurfaces which are defined by polar weighted homogeneous polynomials.

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16. Stephan Orevkov

Title. *TBA*

Abstract. To be sent

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17. Arkadiusz Płoski

Title. *On the jacobian Newton polygon of a plane curve singularity*

Abstract. Let $(C,0)$ be the germ of a plane curve given near the origin $0 \in \mathbb{C}^2$ by analytic equation $f(x,y) = 0$. Let $l(x,y) = bx - ay$ be a linear form such that the line $l(x,y) = 0$ is not tangent to $(C,0)$. The jacobian Newton polygon $N_j(C)$ of $(C,0)$ is the Newton polygon in the coordinates (u,v) of the discriminant $\Delta(u,v)$ obtained by eliminating the variables x, y from the equations $l(x,y) = u$, $f(x,y) = v$, $\mathrm{Jac}(f,l)(x,y) = 0$. The jacobian Newton polygon is independent of l. B. Teissier (1977) proved that $Jn(C)$ is an equisingularity invariant of $(C,0)$ and that the Milnor number, $\mathcal{C}^\infty$-degree of sufficiency and Łojasiewicz exponent can be computed by means of $Jn(C)$. If the germ $(C,0)$ is irreducible then by a result of M. Merle $Jn(C)$ is even a complete invariant of its equisingularity. Our aim is to present some recent results on the jacobian Newton polygon: explicit formulæ for the slopes of $Jn(C)$ in terms of characteristic and intersection multiplicities of branches (J. Gwoździewicz and A. Płoski 2005), calculation of $Jn(C)$ for non-degenerated singularities (A. Lenarcik, M. Masternak and A. Płoski 2003), examples of invariants that cannot be recovered from $Jn(C)$ (Lenarcik 2006), an arithmetical characterization of the jacobian Newton polygon of branches (E. García Barroso and J. Gwoździewicz 2007). We will present also some applications to affine plane curves.

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18. Patrick Popescu-Pampu

Title. *On the Milnor fibers of cyclic quotient singularities*

Abstract. I will report on a joint work with András Némethi. Paolo Lisca classified up to diffeomorphisms the Stein fillings of the lens spaces endowed with their standard contact structure. He used as parameters for this classification the same combinatorial objects as the ones used by Christophersen and Stevens to parametrize the irreducible components of the reduced miniversal base space of the cyclic quotient singularity whose contact boundary is a given contact lens space. This made him conjecture that the Milnor fiber associated to a component is diffeomorphic to the Stein space parametrized in the same way. We proved a stronger version of his conjecture. I will explain the steps of this proof.

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19. Peter Russell

Title. *TBA*

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20. Avinash Sathaye

Title. *TBA*

Abstract. To be sent

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21. Jacques Tilouine

Title. *Companion forms and modularity of genus two curves*

Abstract. In order to carry out a generalization of the Buzzard-Taylor construction (which proves the modularity of degree 2 Artin representations) for studying the modularity of genus two curves, we construct by p-adic deformation a companion form to a p-adic overconvergent weight two genus two Siegel form. The goal is to glue these p-adic forms into a classical form.

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22. Willem Veys

Title. *Zeta functions and monodromy for ideals*

Abstract. The monodromy conjecture states an intriguing relation between two singularity invariants of a complex polynomial: every pole of its topological (or related) zeta function should induce one of its monodromy eigenvalues. By now it is proven for polynomials in two variables, and there are various partial results in higher dimension. One also associates in an obvious way a topological (and related) zeta function to several polynomials, or say to an ideal. Although now the concept of Milnor ?bre is not clear, there is a notion of *Verdier monodromy*, associated to an arbitrary ideal. We present in arbitrary dimension a formula à la A?Campo to compute the eigenvalues of this *Verdier monodromy*, and we prove a generalized monodromy conjecture for arbitrary ideals in two variables.

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23. Terry Wall

Title. *Geometry of projection-generic space curves*

Abstract. In earlier work, by studying the family of projections of a curve C embedded in projective space P^3 from a variable point of space, I arrived at a definition of a class of curves, forming a dense open set in $C^\infty(S^1, P^3(\mathbf{R}))$ such that the family of projections of a curve in this class is stable in a certain sense under perturbations of C: we call the curves in this class projection-generic. The definition makes sense also in the complex case.

The partition of projective space according to the singularities of the corresponding projection of C is a stratification. Its local structure outside C is the same as that of the versal unfoldings of the singularities presented.

To study points on C we introduce the blow-up B_C of P^3 along C, with exceptional locus E_C. We have a family $\{\Gamma_z\}$ of plane curves, parametrised by $z \in B_C$: if $z = P \notin E_C$, Γ_z is the projection C_P of C from P; if $z = (P, \Pi) \in E_C$, Γ_z is the union of C_P and the line determined by Π. We saw in the earlier work that this is a flat family.

If $z = (P, \Pi)$ and the projection Y_P of the tangent at P is not a singular point of Γ_z, then the family $\{\Gamma_w \,|\, w \in E_C\}$ can be regarded as a family of parametrised curves, and versally unfolds the singularities of Γ_z. Otherwise we find that the double point number δ of Γ_z drops by 1 for $z \notin E_C$. We establish a theory of

versality for unfoldings of A or D singularities such that δ drops by at most 1, and show that in the remaining cases, $\{\Gamma_w \mid w \in B_C\}$ versally unfolds the singularities of Γ_z in this sense.

This implies normal forms for the stratification of B_C; further work allows us to derive normal forms for the stratification of P^3, except at points P where the tangent to C meets the curve again: here we can draw pictures, but do not expect there to be a precise normal form.

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24. Mikhail Zaidenberg

Title. *Uniqueness of $\mathbb{C}^*$-actions on affine surfaces*

Abstract. This talk is based on a joint work with H. Flenner and S. Kaliman. A classification of affine surfaces with a good (or elliptic) $\mathbb{C}^*$-action was done in the work of Białynicki-Birula, Orlik and Wagreich, Fieseler and L. Kaup, e.a. There are two more types, parabolic and hyperbolic, of normal affine $\mathbb{C}^*$-surfaces; their graded rings admit a simple Dolgachev-Pinkham-Demazure (DPD) description. In terms of this DPD description, all principal geometric invariants of the surface can be expressed. Given an affine surface, to find all possible such DPD presentations is the same as to find all conjugacy classes of the $\mathbb{C}^*$-subgroups in the full automorphism group. In most cases, up to inversion $t \longmapsto t^{-1}$ in $\mathbb{C}^*$, there is just one such conjugacy class, and so just one (up to a natural equivalence) DPD presentation. In the talk we will concentrate on the exceptional cases, where there are many conjugacy classes of $\mathbb{C}^*$-actions.

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