Mathematisches Forschungsinstitut Oberwolfach

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Singularities

Organised by
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Abstract. noindent This is the report of the Oberwolfach Workshop on singularity theory held in september 2006. Singularity theory is concerned with the local structure of maps and spaces that occur in many situations in mathematics. It uses methods from algebra, topology and algebraic geometry for their study.

Mathematics Subject Classification (2000): 14Bxx, 32Sxx, 58Kxx.

Introduction by the Organisers

The Oberwolfach workshop *Singularity Theory* was held in the week September 10th–September 15th, 2006. It was organised by J. Steenbrink (Nijmegen), D. van Straten (Mainz) and V. Vassiliev (Moskow) and continued the sequence of workshops *Singularitäten* that take place regularly at Oberwolfach.

The morning sessions consisted of three talks, which were complemented with two talks in the afternoon. So by taking the traditional Oberwolfach hike on wednesday into account, a total of 23 full hour talks was presented during the workshop.

A broad variety of topics was covered by the speakers. Normal surface singularities continue to pose some big questions which were adressed in the talks of A. Nemethi and A. Melle. The theory of motivic integration has brought the arc structure of singularities into the focus of current interest. A. Reguera and P. Popescu-Pampu reported on recent progress related to the original Nash-problem. F. Loeser reported on the first steps in non-archimedian local analytic geometry, A. Parushinski talked on conormal geometry. There has been an increased activity around global aspects of singularity theory, characteristic classes, Thom-polynomials and their applications. These topics were adressed by M. Kazarian, M. Weiss J. Schürmann and V. Sedykh. Applications of ideas from singularity

theory to the geometry of the fundamental group were presented in the talks by A. Dimca, V. Kulikov and A. Libgober. S. Shadrin presented a conjectural method to produce tautological relations in the cohomology of the moduli space $\mathcal{M}_{g,n}$ and O. Tommasi reported on the rational cohomology of $\mathcal{M}_4$. A. Gorinov talked about bounds for the size of the automorphism group of complete intersections that arise from the computation of the cohomology of the discriminant-complement. The recent interest in the Hodge/Twistor structures associated to isolated hypersurface germs and tame polynomials on affine varieties, reported on by C. Sevenheck and C. Hertling, stems partly from the interpretation of quantum cohomology via mirror symmetry in terms of so-called Landau-Ginsburg models. D. Mond talked about his idea to relate these to the theory of functions on a free divisor. J. Christophersen showed us a Calabi-Yau space appearing in the deformation theory of a degenerate abelian surface. A. Gabrielov talked about the maximally inflected rational curves and its relation to the Bethe Ansatz. A. Takahasi presented his results for exceptional collections in the category maximal Cohen-Macaulay modules on hypersurface singularities and its mirror interpretation in the case of the exceptional singularities.

An informal concert by J. Steenbrink on piano und M. Weiss on flute formed the musical coda of the workshop.

The organisers would like to use this occasion to thank the Oberwolfach staff for their efficient handling of boundary conditions, which created the unique Oberwolfach athmosphere that helped to make the workshop a success.