

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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Complex Algebraic Geometry

Organised by
Fabrizio Catanese, Bayreuth
Yujiro Kawamata, Tokyo
Gang Tian, Princeton
Eckart Viehweg, Essen

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ABSTRACT. The Conference focused on several classical and novel theories in the realm of complex algebraic geometry, such as Algebraic surfaces, Moduli theory, Minimal Model Program, Abelian Varieties, Holomorphic Symplectic Varieties, Homological algebra, Kähler manifolds theory, Holomorphic dynamics, Quantum cohomology.

Mathematics Subject Classification (2000): 14xx, 18xx, 32xx, 53xx.

Introduction by the Organisers

The Workshop Komplexe algebraische Geometrie, organized by Fabrizio Catanese (Bayreuth), Yujiro Kawamata (Tokyo), Gang Tian (Princeton), and Eckart Viehweg (Essen), drew together 49 participants in spite of the ghost of the swine flue.

There were several PhD students and other young PostDocs in their 20 's and early 30 's, together with established leaders of the fields related to the thematic title of the workshop. There were 21 talks which lasted 50 minutes, and other 4 talks by junior participants which lasted 30 minutes. All the talks were followed by a lively 10 minutes discussion. The schedule left sufficiently ample time for the exchange of mathematical ideas.

As usual at an Oberwolfach Meeting, the mathematical discussions continued outside the lecture room throughout the day and the night.

The Conference was fully successful in setting in contact younger researchers with elder ones. There were fruitful exchanges between mathematicians with different specializations and backgrounds.

New fashionable topics were presented, alongside with new insights on long standing classical open problems, and also cross-fertilizations with other research topics: as algebraic geometry in positive characteristic and \mathcal{D} -modules (talk by Esnault), quantum cohomology and enumerative geometry (talk by Jun Li), and application of the Ricci flow techniques to Minimal Model Program (talk by Zhou).

A central role was occupied by the recent developments around the Minimal Model Program: a simpler proof of the finite generation of canonical rings (Corti), progress towards Shokurov's ACC conjecture (Ein, Mustata), and the Zariski decomposition problem (Birkar).

Moduli spaces and their compactifications were a central theme too: compactified moduli spaces of stable varieties appeared from a theoretical viewpoint in the new results presented by Kovacs, and more concretely in the talks by Pardini and Rollenske.

Moduli spaces also played a dominant role: as in the talks by Farkas (moduli of curves) and Bauer (moduli spaces of 'special' surfaces of general type).

Algebraic surfaces, of special and of general type, appeared throughout in several talks, by Bauer, Li, Mukai, Pardini, Pignatelli, Rollenske.

Homological algebra and derived categories, with applications to classification theory, were covered by talks by Schreyer, Ishii, Nakaoka, Lazarsfeld.

The talk by Lazarsfeld built a new bridge between homological algebra and Kähler manifold theory, applying the Bernstein-Gelfand-Gelfand correspondence to obtain powerful new extensions of the classical inequalities by Castelnuovo for irregular varieties.

In the classical theory of Abelian and Modular varieties there were interesting expositions of new results by van der Geer and Hulek.

There were also other very interesting topics treated:

- Holomorphic dynamics: Siegel disks on rational and K3 surfaces (Oguiso);
- Hyperdiscriminants, Chow forms and Mabuchi energy of Kähler manifolds (Paul);
- Mori theory and Fano varieties (Totaro);
- holomorphic symplectic varieties (Debarre and Namikawa).

The variety of striking results and the very interesting and challenging proposals made the participation in the workshop very rewarding. We hope that these abstracts will convey our enthusiasm to the readers, and we are sure that they will be quite useful to the mathematical community.