Mathematisches Forschungsinstitut Oberwolfach

Report No. 27/2013
DOI: 10.4171/OWR/2013/27

Complex Algebraic Geometry

Organised by
Fabrizio Catanese, Bayreuth
Christopher Hacon, Salt Lake City
Yujiro Kawamata, Tokyo
Bernd Siebert, Hamburg

26 May – 1 June 2013

Abstract. The conference focused on several topics, classical and modern, in the classification theory of compact algebraic and Kähler varieties, and on several methods, from singularity theory, topology, homological algebra, Geometric Invariant Theory and Moduli theory, char p methods.

Mathematics Subject Classification (2010): 14xx, 18xx, 32xx, 53xx.

Introduction by the Organisers

The workshop Complex Algebraic Geometry, organized by Fabrizio Catanese (Bayreuth), Christopher Hacon (Salt Lake City), Yujiro Kawamata (Tokyo) and Bernd Siebert (Hamburg), drew together 52 participants from all over the world.

There were several young PhD students and PostDocs, and a quite remarkable group of established leaders of the fields related to the thematic title of the workshop. It was quite difficult to decide which talks to choose for the program, in view of the variety of very attractive options. Eventually, thanks to the kind offer of some senior participants to decline the offer to deliver a talk, we ended with 21 50 minutes talks, all followed by a lively discussion.

As usual at an Oberwolfach Meeting, the mathematical discussions continued outside the lecture room throughout the day and the night. The Conference fully realized the aim of setting in contact mathematicians with different specializations and non uniform background, of presenting new fashionable topics alongside with new insights on long standing classical open problems.

A central role was played by classification theory of projective and Kähler varieties, their minimal models, vanishing theorems, generic positivity, base point
freeness, and the role of singularities. (for instance pertaining to the classification of ). There were talks on new results on algebraic surfaces, on irregular varieties, quotients of Abelian varieties, Fano manifolds, and compactifications of the vector group. Some talks were dedicated to the plane Cremona group and to the use of derived categories for rationality questions.

Chow and Hilbert schemes, GIT limits, stability, moduli spaces, were another direction which was present. The action of the absolute Galois group on moduli spaces and on the topology and Hodge structure of varieties was also another theme. Finally, different approaches to moduli spaces of curves with symmetries were presented.

In spite of the title of the conference, also characteristic p methods and problems were exposed.

The variety of striking results and the very interesting and challenging proposals presented in the workshop made the participation highly rewarding. We hope that these abstracts will give a clear and attractive picture, which will be useful to the mathematical community.
**Workshop: Complex Algebraic Geometry**

**Table of Contents**

Ingrid Bauer (joint with F. Catanese, F. Grunewald)
*Faithful Actions of Gal(\overline{\mathbb{Q}}/\mathbb{Q}) and Change of Fundamental Group* ........ 1567

Arnaud Beauville
*A tale of two surfaces* ....................................................... 1570

Frédéric Campana (joint with Mihai Păun)
*Birational stability of the orbifold cotangent bundle* .............. 1573

Paolo Cascini (joint with Hiromu Tanaka and Chenyang Xu)
*On base point freeness in positive characteristic* ................. 1575

Ciro Ciliberto (joint with Margarida Mendes Lopes, Rita Pardini)
*Abelian varieties in Brill–Noether loci and irregular surfaces* ........ 1577

Igor Dolgachev
*Non-simplicity of the planar Cremona group (after S. Cantat and S. Lamy)* ...................................................... 1580

Yoshinori Gongyo (joint with A. Sannai, S. Okawa, S. Takagi)
*Characterization of varieties of Fano type via singularities of Cox rings* 1584

Daniel Greb (joint with Stefan Kebekus and Thomas Peternell)
*Étale fundamental groups of klt spaces, flat sheaves, and quotients of Abelian varieties* ...................... 1586

Jun-Muk Hwang (joint with Baohua Fu)
*Equivariant compactifications of the vector group* ................ 1589

Shihoko Ishii
*MJ-discrepancy and Shokurov’s conjectures* .............................. 1591

L. Katzarkov
*Dynamical Systems and categories* ........................................ 1592

Sándor J Kovács
*Steenbrink vanishing extended* ........................................... 1594

Vik. S. Kulikov
*Covering semigroups* ...................................................... 1595

Wenfei Liu (joint with Sönke Rollenske)
*From surfaces of general type to stable (log) surfaces* ............ 1598

Shigeru Mukai
*Enriques surfaces as neighbors of rational surfaces (and vice versa)* . . 1599
Fabio Perroni (joint with Fabrizio Catanese, Michael Lönne)
   *On the components of moduli spaces of curves with symmetry* ........... 1602

Thomas Peternell (joint with Andreas Höring)
   *Minimal models for Kähler threefolds* ........................................ 1606

Stefan Schreieder
   *Multiplicative Hodge structures of conjugate varieties* ..................... 1610

Pawel Sosna (joint with Christian Böhning, Hans-Christian Graf von
   Bothmer)
   *Derived categories of some surfaces of general type and rationality
     questions* .................................................................................. 1612

Ravi Vakil (joint with Nikola Penev)
   *Toward the Chow ring of the moduli space of genus 6 curves* ............. 1615

Chenyang Xu (joint with Xiaowei Wang)
   *Nonexistence of asymptotically chow semistable limit* ...................... 1617

Takehiko Yasuda (joint with Melanie Machett Wood)
   *Bhargava’s formula and the Hilbert scheme of points* ....................... 1619

Kang Zuo
   *Semi stable Higgs bundles and representations of fundamental groups
     over positive and mixed characteristic* ......................................... 1621