CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

LONDON MATHEMATICAL SOCIETY LECTURE NOTE SERIES

Managing Editor: Professor N.J. Hitchin, Mathematics Institute,
University of Oxford, 24–29 St Giles, Oxford OX1 3TG, United Kingdom

The titles below are available from booksellers, or, in case of difficulty, from Cambridge University Press.

46 *p*-adic Analysis: a short course on recent work, N. KOBLITZ
59 Applicable differential geometry, M. CRAMPIN & F.A.E. PIRANI
66 Several complex variables and complex manifolds II, M.J. FIELD
86 Topological topics, I.M. JAMES (ed)
87 Surveys in set theory, A.R.D. MATHIAS (ed)
88 FPF ring theory, C. FAITH & S. PAGE
89 An F-space sampler, N.J. KALTON, N.T. PECK & J.W. ROBERTS
90 Polytopes and symmetry, S.A. ROBERTSON
92 Representations of rings over skew fields, A.H. SCHOFIELD
93 Aspects of topology, I.M. JAMES & E.H. KRONHEIMER (eds)
96 Diophantine equations over function fields, R.C. MASON
97 Varieties of constructive mathematics, D.S. BRIDGES & F. RICHMAN
98 Localization in Noetherian rings, A.V. JATEGAONKAR
99 Methods of differential geometry in algebraic topology, M. KAROUBI & C. LERUSTE
100 Stopping time techniques for analysts and probabilists, L. EGGHE
104 Elliptic structures on 3-manifolds, C.B. THOMAS
105 A local spectral theory for closed operators, I. ERDELYI & WANG SHENGWANG
107 Compactification of Siegel moduli schemes, C.-L. CHAI
109 Diophantine analysis, J. LOXTON & A. VAN DER POORTEN (eds)
113 Lectures on the asymptotic theory of ideals, D. REES
114 Lectures on Bochner-Riesz means, K.M. DAVIS & Y.-C. CHANG
116 Representations of algebras, P.J. WEBB (ed)
119 Triangulated categories in the representation theory of finite-dimensional algebras, D. HAPPEL
121 Proceedings of *Groups - St Andrews 1985*, E. ROBERTSON & C. CAMPBELL (eds)
128 Descriptive set theory and the structure of sets of uniqueness, A.S. KECHRIS & A. LOUVEAU
130 Model theory and modules, M. PREST
131 Algebraic, extremal & metric combinatorics, M.-M. DEZA, P. FRANKL & I.G. ROSENBERG (eds)
132 Whitehead groups of finite groups, ROBERT OLIVER
133 Linear algebraic monoids, MOHAN S. PUTCHA
134 Number theory and dynamical systems, M. DODSON & J. VICKERS (eds)
137 Analysis at Urbana, I, E. BERKSON, T. PECK, & J. UHL (eds)
138 Analysis at Urbana, II, E. BERKSON, T. PECK, & J. UHL (eds)
139 Advances in homotopy theory, S. SALAMON, B. STEER & W. SUTHERLAND (eds)
140 Geometric aspects of Banach spaces, E.M. PEINADOR & A. RODES (eds)
141 Surveys in combinatorics 1989, J. SIEMONS (ed)
144 Introduction to uniform spaces, I.M. JAMES
146 Cohen-Macaulay modules over Cohen-Macaulay rings, Y. YOSHINO
148 Helices and vector bundles, A.N. RUDAKOV *et al*
149 Solitons, nonlinear evolution equations and inverse scattering, M. ABLOWITZ & P. CLARKSON
150 Geometry of low-dimensional manifolds 1, S. DONALDSON & C.B. THOMAS (eds)
151 Geometry of low-dimensional manifolds 2, S. DONALDSON & C.B. THOMAS (eds)
152 Oligomorphic permutation groups, P. CAMERON
153 L-functions and arithmetic, J. COATES & M.J. TAYLOR (eds)
155 Classification theories of polarized varieties, TAKAO FUJITA
156 Twistors in mathematics and physics, T.N. BAILEY & R.J. BASTON (eds)
158 Geometry of Banach spaces, P.F.X. MÜLLER & W. SCHACHERMAYER (eds)
159 Groups St Andrews 1989 volume 1, C.M. CAMPBELL & E.F. ROBERTSON (eds)
160 Groups St Andrews 1989 volume 2, C.M. CAMPBELL & E.F. ROBERTSON (eds)
161 Lectures on block theory, BURKHARD KÜLSHAMMER
162 Harmonic analysis and representation theory, A. FIGA-TALAMANCA & C. NEBBIA
163 Topics in varieties of group representations, S.M. VOVSI
164 Quasi-symmetric designs, M.S. SHRIKANDE & S.S. SANE
166 Surveys in combinatorics, 1991, A.D. KEEDWELL (ed)
168 Representations of algebras, H. TACHIKAWA & S. BRENNER (eds)
169 Boolean function complexity, M.S. PATERSON (ed)
170 Manifolds with singularities and the Adams-Novikov spectral sequence, B. BOTVINNIK
171 Squares, A.R. RAJWADE
172 Algebraic varieties, GEORGE R. KEMPF
173 Discrete groups and geometry, W.J. HARVEY & C. MACLACHLAN (eds)
174 Lectures on mechanics, J.E. MARSDEN
175 Adams memorial symposium on algebraic topology 1, N. RAY & G. WALKER (eds)
176 Adams memorial symposium on algebraic topology 2, N. RAY & G. WALKER (eds)
177 Applications of categories in computer science, M. FOURMAN, P. JOHNSTONE & A. PITTS (eds)
178 Lower K- and L-theory, A. RANICKI
179 Complex projective geometry, G. ELLINGSRUD *et al*
180 Lectures on ergodic theory and Pesin theory on compact manifolds, M. POLLICOTT
181 Geometric group theory I, G.A. NIBLO & M.A. ROLLER (eds)
182 Geometric group theory II, G.A. NIBLO & M.A. ROLLER (eds)

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

183 Shintani zeta functions, A. YUKIE
184 Arithmetical functions, W. SCHWARZ & J. SPILKER
185 Representations of solvable groups, O. MANZ & T.R. WOLF
186 Complexity: knots, colourings and counting, D.J.A. WELSH
187 Surveys in combinatorics, 1993, K. WALKER (ed)
188 Local analysis for the odd order theorem, H. BENDER & G. GLAUBERMAN
189 Locally presentable and accessible categories, J. ADAMEK & J. ROSICKY
190 Polynomial invariants of finite groups, D.J. BENSON
191 Finite geometry and combinatorics, F. DE CLERCK *et al*
192 Symplectic geometry, D. SALAMON (ed)
194 Independent random variables and rearrangement invariant spaces, M. BRAVERMAN
195 Arithmetic of blowup algebras, WOLMER VASCONCELOS
196 Microlocal analysis for differential operators, A. GRIGIS & J. SJÖSTRAND
197 Two-dimensional homotopy and combinatorial group theory, C. HOG-ANGELONI *et al*
198 The algebraic characterization of geometric 4-manifolds, J.A. HILLMAN
199 Invariant potential theory in the unit ball of $\mathbf{C}^n$, MANFRED STOLL
200 The Grothendieck theory of dessins d'enfant, L. SCHNEPS (ed)
201 Singularities, JEAN-PAUL BRASSELET (ed)
202 The technique of pseudodifferential operators, H.O. CORDES
203 Hochschild cohomology of von Neumann algebras, A. SINCLAIR & R. SMITH
204 Combinatorial and geometric group theory, A.J. DUNCAN, N.D. GILBERT & J. HOWIE (eds)
205 Ergodic theory and its connections with harmonic analysis, K. PETERSEN & I. SALAMA (eds)
207 Groups of Lie type and their geometries, W.M. KANTOR & L. DI MARTINO (eds)
208 Vector bundles in algebraic geometry, N.J. HITCHIN, P. NEWSTEAD & W.M. OXBURY (eds)
209 Arithmetic of diagonal hypersurfaces over finite fields, F.Q. GOUVÊA & N. YUI
210 Hilbert C*-modules, E.C. LANCE
211 Groups 93 Galway / St Andrews I, C.M. CAMPBELL *et al* (eds)
212 Groups 93 Galway / St Andrews II, C.M. CAMPBELL *et al* (eds)
214 Generalised Euler-Jacobi inversion formula and asymptotics beyond all orders, V. KOWALENKO *et al*
215 Number theory 1992–93, S. DAVID (ed)
216 Stochastic partial differential equations, A. ETHERIDGE (ed)
217 Quadratic forms with applications to algebraic geometry and topology, A. PFISTER
218 Surveys in combinatorics, 1995, PETER ROWLINSON (ed)
220 Algebraic set theory, A. JOYAL & I. MOERDIJK
221 Harmonic approximation, S.J. GARDINER
222 Advances in linear logic, J.-Y. GIRARD, Y. LAFONT & L. REGNIER (eds)
223 Analytic semigroups and semilinear initial boundary value problems, KAZUAKI TAIRA
224 Computability, enumerability, unsolvability, S.B. COOPER, T.A. SLAMAN & S.S. WAINER (eds)
225 A mathematical introduction to string theory, S. ALBEVERIO, J. JOST, S. PAYCHA, S. SCARLATTI
226 Novikov conjectures, index theorems and rigidity I, S. FERRY, A. RANICKI & J. ROSENBERG (eds)
227 Novikov conjectures, index theorems and rigidity II, S. FERRY, A. RANICKI & J. ROSENBERG (eds)
228 Ergodic theory of $\mathbf{Z}^d$ actions, M. POLLICOTT & K. SCHMIDT (eds)
229 Ergodicity for infinite dimensional systems, G. DA PRATO & J. ZABCZYK
230 Prolegomena to a middlebrow arithmetic of curves of genus 2, J.W.S. CASSELS & E.V. FLYNN
231 Semigroup theory and its applications, K.H. HOFMANN & M.W. MISLOVE (eds)
232 The descriptive set theory of Polish group actions, H. BECKER & A.S. KECHRIS
233 Finite fields and applications, S. COHEN & H. NIEDERREITER (eds)
234 Introduction to subfactors, V. JONES & V.S. SUNDER
235 Number theory 1993–94, S. DAVID (ed)
236 The James forest, H. FETTER & B. GAMBOA DE BUEN
237 Sieve methods, exponential sums, and their applications in number theory, G.R.H. GREAVES *et al*
238 Representation theory and algebraic geometry, A. MARTSINKOVSKY & G. TODOROV (eds)
239 Clifford algebras and spinors, P. LOUNESTO
240 Stable groups, FRANK O. WAGNER
241 Surveys in combinatorics, 1997, R.A. BAILEY (ed)
242 Geometric Galois actions I, L. SCHNEPS & P. LOCHAK (eds)
243 Geometric Galois actions II, L. SCHNEPS & P. LOCHAK (eds)
244 Model theory of groups and automorphism groups, D. EVANS (ed)
245 Geometry, combinatorial designs and related structures, J.W.P. HIRSCHFELD *et al*
246 p-Automorphisms of finite p-groups, E.I. KHUKHRO
247 Analytic number theory, Y. MOTOHASHI (ed)
248 Tame topology and o-minimal structures, LOU VAN DEN DRIES
249 The atlas of finite groups: ten years on, ROBERT CURTIS & ROBERT WILSON (eds)
250 Characters and blocks of finite groups, G. NAVARRO
251 Gröbner bases and applications, B. BUCHBERGER & F. WINKLER (eds)
252 Geometry and cohomology in group theory, P. KROPHOLLER, G. NIBLO, R. STÖHR (eds)
253 The q-Schur algebra, S. DONKIN
254 Galois representations in arithmetic algebraic geometry, A.J. SCHOLL & R.L. TAYLOR (eds)
255 Symmetries and integrability of difference equations, P.A. CLARKSON & F.W. NIJHOFF (eds)
257 An introduction to noncommutative differential geometry and its physical applications, 2ed, J. MADORE
260 Groups St Andrews 1997 in Bath, I, C.M. CAMPBELL *et al* (eds)
261 Groups St Andrews 1997 in Bath, II, C.M. CAMPBELL *et al* (eds)
264 New trends in algebraic geometry, K. HULEK, F. CATANESE, C. PETERS & M. REID (eds)

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

London Mathematical Society Lecture Note Series. 264

New Trends in Algebraic Geometry

EuroConference on Algebraic Geometry Warwick, July 1996

Edited by

Klaus Hulek (chief editor)
Universität Hannover

Fabrizio Catanese
Georg-August-Universität, Göttingen

Chris Peters
Université de Grenoble

Miles Reid
University of Warwick

CAMBRIDGE UNIVERSITY PRESS

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press
The Edinburgh Building, Cambridge CB2 2RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521646598

© Cambridge University Press 1999

This publication is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without
the written permission of Cambridge University Press.

First published 1999

A catalogue record for this publication is available from the British Library

ISBN-13 978-0-521-64659-8 paperback
ISBN-10 0-521-64659-6 paperback

Transferred to digital printing 2005

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

Contents

Victor V. Batyrev: Birational Calabi–Yau n-folds have equal Betti numbers 1

Arnaud Beauville: A Calabi–Yau threefold with non-Abelian fundamental group 13

K. Behrend: Algebraic Gromov–Witten invariants 19

Philippe Eyssidieux: Kähler hyperbolicity and variations of Hodge structures 71

Carel Faber: Algorithms for computing intersection numbers on moduli spaces of curves, with an application to the class of the locus of Jacobians 93

Marat Gizatullin: On some tensor representations of the Cremona group of the projective plane 111

Y. Ito and I. Nakamura: Hilbert schemes and simple singularities 151

Oliver Küchle and Andreas Steffens: Bounds for Seshadri constants 235

Marco Manetti: Degenerate double covers of the projective plane 255

David R. Morrison: The geometry underlying mirror symmetry 283

Shigeru Mukai: Duality of polarized K3 surfaces 311

Roberto Paoletti: On symplectic invariants of algebraic varieties coming from crepant contractions 327

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

Kapil H. Paranjape: The Bogomolov–Pantev resolution, an expository account **347**

Tetsuji Shioda: Mordell–Weil lattices for higher genus fibration over a curve **359**

Bernd Siebert: Symplectic Gromov–Witten invariants **375**

Claire Voisin: A generic Torelli theorem for the quintic threefold **425**

P.M.H. Wilson: Flops, Type III contractions and Gromov–Witten invariants on Calabi–Yau threefolds **465**

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

Foreword

The volume contains a selection of seventeen survey and research articles from the July 1996 Warwick European algebraic geometry conference. These papers give a lively picture of current research trends in algebraic geometry, and between them cover many of the outstanding hot topics in the modern subject. Several of the papers are expository accounts of substantial new areas of advance in mathematics, carefully written to be accessible to the general reader. The book will be of interest to a wide range of students and nonexperts in different areas of mathematics, geometry and physics, and is required reading for all specialists in algebraic geometry.

The European algebraic geometry conference was one of the climactic events of the 1995–96 EPSRC Warwick algebraic geometry symposium, and turned out to be one of the major algebraic geometry events of the 1990s. The scientific committee consisted of A. Beauville (Paris), F. Catanese (Pisa), K. Hulek (Hannover) and C. Peters (Grenoble) representing AGE (Algebraic Geometry in Europe, an EU HCM–TMR network) and N.J. Hitchin (Oxford), J.D.S. Jones and M. Reid (Warwick) representing Warwick and British mathematics. The conference attracted 178 participants from 22 countries and featured 33 lectures from a star-studded cast of speakers, including most of the authors represented in this volume.

The expository papers Five of the articles are expository in intention: among these a beautiful short exposition by Paranjape of the new and very simple approach to the resolution of singularities; a detailed essay by Ito and Nakamura on the ubiquitous ADE classification, centred around simple surface singularities; a discussion by Morrison of the new special Lagrangian approach giving geometric foundations to mirror symmetry; and two deep and informative survey articles by Behrend and Siebert on Gromov–Witten invariants, treated from the contrasting viewpoints of algebraic and symplectic geometry.

Some main overall topics Many of the papers in this volume group around a small number of main research topics. Gromov–Witten invariants

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

was one of the main new breakthroughs in geometry in the 1990s; they can be developed from several different starting points in symplectic or algebraic geometry. The survey of Siebert covers the analytic background to the symplectic point of view, and outlines the proof that the two approaches define the same invariants. Behrend's paper explains the approach in algebraic geometry to the invariants via moduli stacks and the virtual fundamental class, which essentially amounts to a very sophisticated way of doing intersection theory calculations. The papers by Paoletti and Wilson give parallel applications of Gromov–Witten invariants to higher dimensional varieties: Wilson's paper determines the Gromov–Witten invariants that arise from extremal rays of the Mori cone of Calabi–Yau 3-folds, whereas Paoletti proves that Mori extremal rays have nonzero associated Gromov–Witten invariants in many higher dimensional cases. The upshot is that extremal rays arising in algebraic geometry are in fact in many cases invariant in the wider symplectic and topological setting.

Another area of recent spectacular progress in geometry and theoretical physics is Calabi–Yau 3-folds and mirror symmetry. This was another major theme of the EuroConference that is well represented in this volume. The paper by Voisin, which is an extraordinary computational tour-de-force, proves the generic Torelli theorem for the most classical of all Calabi–Yau 3-folds, the quintic hypersurface in $\mathbb{P}^4$. The survey by Morrison explains, among other things, the Strominger–Yau–Zaslow special Lagrangian interpretation of mirror symmetry. Beauville's paper gives the first known construction of a Calabi–Yau 3-fold having the quaternion group of order 8 as its fundamental group. The paper by Batyrev proves that the Betti numbers of a Calabi–Yau 3-fold are birationally invariant, using the methods of p-adic integration and the Weil conjectures; the idea of the paper is quite startling at first sight (and not much less so at second sight), but it is an early precursor of Kontsevich's idea of motivic integration, as worked out in papers of Denef and Loeser. Several other papers in this volume (those of Ito and Nakamura, Mukai, Shioda and Wilson) are implicitly or explicitly related to Calabi–Yau 3-folds in one way or another.

Other topics The remaining papers, while not necessarily strictly related in subject matter, include some remarkable achievements that illustrate the breadth and depth of current research in algebraic geometry. Shioda extends his well-known results on the Mordell–Weil lattices of elliptic surfaces to higher genus fibrations, in a paper that will undoubtedly have substantial repercussions in areas as diverse as number theory, classification of surfaces, lattice theory and singularity theory. Faber continues his study of tautological classes on the moduli space of curves and Abelian varieties, and gives an algorithmic treatment of their intersection numbers, that parallels in many

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

respects the Schubert calculus; he obtains the best currently known partial results determining the class of the Schottky locus. Gizatullin initiates a fascinating study of representations of the Cremona group of the plane by birational transformations of spaces of plane curves. Eyssidieux gives a study, in terms of Gromov's Kähler hyperbolicity, of universal inequalities holding between the Chern classes of vector bundles over Hermitian symmetric spaces of noncompact type admitting a variation of Hodge structures. Küchle and Steffens' paper contains new twists on the idea of Seshadri constants, a notion of local ampleness arising in recent attempts on the Fujita conjecture; they use in particular an ingenious scaling trick to provide improved criteria for the very ampleness of adjoint line bundles.

Manetti's paper continues his long-term study of surfaces of general type constructed as iterated double covers of $\mathbb{P}^2$. He obtains many constructions of families of surfaces, and proves that these give complete connected components of their moduli spaces, provided that certain naturally occuring degenerations of the double covers are included. This idea is used here to establish a bigger-than-polynomial lower bound on the growth of the number of connected components of moduli spaces. In more recent work, he has extended these ideas in a spectacular way to exhibit the first examples of algebraic surfaces that are proved to be diffeomorphic but not deformation equivalent.

The Fourier–Mukai transform is now firmly established as one of the most important new devices in algebraic geometry. The idea, roughly speaking, is that a sufficiently good moduli family of vector bundles (say) on a variety X induces a correspondence between X and the moduli space $\widehat{X}$. In favourable cases, this correspondence gives an equivalence of categories between coherent sheaves on X and on $\widehat{X}$ (more precisely, between their derived categories). The model for this theory is provided by the case originally treated by Mukai, when X is an Abelian variety and $\widehat{X}$ its dual; Mukai named the transform by analogy with the classical Fourier transform, which takes functions on a real vector space to functions on its dual. It is believed that, in addition to its many fruitful applications in algebraic geometry proper, this correspondence and its generalisations to other categories of geometry will eventually provide the language for mathematical interpretations of the various "dualities" invented by the physicists, for example, between special Lagrangian geometry on a Calabi–Yau 3-fold and coherent algebraic geometry on its mirror partner (which, as described in Morrison's article, is conjecturally a fine moduli space for special Lagrangian tori). Mukai's magic paper in this volume presents a Fourier–Mukai transform for K3 surfaces, in terms of moduli of semi-rigid sheaves; under some minor numerical assumptions, he establishes the existence of a dual K3 surface, the fact that the Fourier–Mukai transform is an equivalence of derived categories, and the biduality result in appropriate cases.

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521646596 - New Trends in Algebraic Geometry: EuroConference on Algebraic Geometry Warwick, July 1996
Edited by Klaus Hulek, Fabrizio Catanese, Chris Peters and Miles Reid
Frontmatter
More information

The paper of Ito and Nakamura is the longest in the volume; it combines a detailed and wide-ranging expository essay on the ADE classification with an algebraic treatment of the McKay correspondence for the Kleinian quotient singularities $\mathbb{C}^2/G$ in terms of the G-orbit Hilbert scheme. The contents of their expository section will probably come as a surprise to algebraic geometers, since alongside traditional aspects of simple singularities and their ADE homologues in algebraic groups and representation of quivers, they lay particular emphasis on partition functions in conformal field theory with modular invariance under $\mathrm{SL}(2,\mathbb{Z})$ and on II_1 factors in von Neumann algebras. Their study of the G-Hilbert scheme makes explicit for the first time many aspects of the McKay correspondence relating the exceptional locus of the Kleinian quotient singularities $\mathbb{C}^2/G$ with the irreducible representations of G; for example, the way in which the points of the minimal resolution can be viewed as defined by polynomial equations in the character spaces of the corresponding irreducible representations, or the significance in algebraic terms of tensoring with the given representation of G. Ito and Nakamura and their coworkers are currently involved in generalising many aspects of the G-orbit Hilbert scheme approach to the resolution of Gorenstein quotient singularities and the McKay correspondence to finite subgroups of $\mathrm{SL}(3,\mathbb{C})$, and this paper serves as a model for what one hopes to achieve.

Thanks to all our sponsors The principal financial support for the EuroConference was a grant of ECU40,000 from EU TMR (Transfer and Mobility of Researchers), contract number ERBFMMACT 950029; we are very grateful for this support, without which the conference could not have taken place. The main funding for the 1995–96 Warwick algebraic geometry symposium was provided by British EPSRC (Engineering and physical sciences research council). Naturally enough, the symposium was one of the principal activities of the Warwick group of AGE (European Union HCM project Algebraic Geometry in Europe, Contract number ERBCHRXCT 940557), and financial support from Warwick AGE and the other groups of AGE was a crucial element in the success of the symposium and the EuroConference. We also benefitted from two visiting fellowships for Nakamura and Klyachko from the Royal Society (the UK Academy of Science). Many other participants were covered by their own research grants.

The University of Warwick, and the Warwick Mathematics Institute also provided substantial financial backing. All aspects of the conference were enhanced by the expert logistic and organisational help provided by the Warwick Math Research Centre's incomparable staff, Elaine Greaves Coelho, Peta McAllister and Hazel Graley.

Klaus Hulek and Miles Reid, November 1998

© Cambridge University Press www.cambridge.org