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Hilbert Modular Forms: mod p and p-Adic Aspects Jan 04 2021 We study Hilbert modular forms in characteristic p and over p-adic rings. In the characteristic p theory we describe the kernel and image of the q-expansion map and prove the existence of filtration for Hilbert modular forms; we define operators U, V and Θ_χ and study the variation of the filtration under these operators. Our methods are geometric - comparing holomorphic Hilbert modular forms with rational functions on a moduli scheme with level-p structure, whose poles are supported on the non-ordinary locus.In the p-adic theory we study congruences between Hilbert modular forms. This applies to the study of congruences between special values of zeta functions of totally real fields. It also allows us to define p-adic Hilbert modular forms 'a la Serre' as p-adic uniform limit of classical modular forms, and compare them with p-adic modular forms 'a la Katz' that are regular functions on a certain formal moduli scheme. We show that the two notions agree for cusp forms and for a suitable class of weights containing all the classical ones. We extend the operators V and Θ_χ to the p-adic setting.

Geometric Aspects of Dwork Theory Jan 22 2020 Dieses zweibändige Werk versammelt Vorlesungen, gehalten in memoriam Professor Bernard Dwork (1923-1998), anlässlich eines dreimonatigen Vorlesungszyklus in Norditalien von Mai bis Juli 2001.

Bad Reduction of Hilbert Modular Varieties with Parahoric Level Structure Nov 25 2022 Abelian varieties can be thought of as a higher dimensional analogue to elliptic curves. Over fields, they are defined as complete algebraic varieties with a compatible group structure. One of the most fertile fields in arithmetic geometry is concerned with the study of abelian varieties in prime characteristic. The fundamental reason why this area has become so central is that the many interesting phenomena arising in positive characteristic provide us with very powerful geometric tools. For instance, several results in characteristic zero can be derived studying the reduction to positive characteristic.A very fruitful approach for describing such phenomena is to look at several abelian varieties at once. Roughly speaking, the abelian varieties of a given dimension are seen as points of a space, namely a \emph{moduli space}. In general, in order for these spaces to have \emph{nice} geometric properties, we will expect the abelian varieties to have additional structure, such as, for example, some data on the N-torsion (kernel of the multiplication by N map, for some positive integer N), called a structure of level N. The fundamental example in this context is that of modular curves that is, spaces whose points parametrize (isomorphism classes of) elliptic curves with some level N structure. The work of the author focuses on a generalization of modular curves, that is, Hilbert modular varieties, parametrizing abelian varieties with polarization, N-level structure and real multiplication, that is, an action by a suitable finite field extension of $\Q$.The most immediate questions arising from the study of such spaces are purely of geometric nature. The geometry of Hilbert modular varieties is well understood in every characteristic p, as long as p does not divide the level structure. When p divides the level structure however, things get complicated. In this thesis we provide a description of Hilbert modular varieties in the case when p divides the level N (case of \emph{parahoric} level). In particular, we obtain an understanding of these spaces by giving a full description of the deformation of abelian varieties and by defining suitable \emph{stratifications} depending on the p-torsion of abelian varieties.

Hilbert Modular Forms and the Galois Representations Associated to Hilbert-Blumenthal Abelian Varieties Feb 14 2022

Escape of Mass on Hilbert Modular Varieties Jan 28 2023

Plectic Arithmetic of Hilbert Modular Varieties Aug 23 2022

Automorphic Forms and Geometry of Arithmetic Varieties May 08 2021 Automorphic Forms and Geometry of Arithmetic Varieties deals with the dimension formulas of various automorphic forms and the geometry of arithmetic varieties. The relation between two fundamental methods of obtaining dimension formulas (for cusp forms), the Selberg trace formula and the index theorem (Riemann-Roch's theorem and the Lefschetz fixed point formula), is examined. Comprised of 18 sections, this volume begins by discussing zeta functions associated with cones and their special values, followed by an analysis of cusps on Hilbert modular varieties and values of L-functions. The reader is then introduced to the dimension formula of Siegel modular forms; the graded rings of modular forms in several variables; and Selberg-Ihara's zeta function for p-adic discrete groups. Subsequent chapters focus on zeta functions of finite graphs and representations of p-adic groups; invariants and Hodge cycles; T-complexes and Ogata's zeta zero values; and the structure of the icosahedral modular group. This book will be a useful resource for mathematicians and students of mathematics.

Mixed Automorphic Forms, Torus Bundles, and Jacobi Forms Mar 25 2020 This volume deals with various topics around equivariant holomorphic maps of Hermitian symmetric domains and is intended for specialists in number theory and algebraic geometry. In particular, it contains a comprehensive exposition of mixed automorphic forms that has never yet appeared in book form. The main goal is to explore connections among complex torus bundles, mixed automorphic forms, and Jacobi forms associated to an equivariant holomorphic map. Both number-theoretic and algebro-geometric aspects of such connections and related topics are discussed.

Hilbert Modular Surfaces Mar 30 2023 Over the last 15 years important results have been achieved in the field of Hilbert Modular Varieties. Though the main emphasis of this book is on the geometry of Hilbert modular surfaces, both geometric and arithmetic aspects are treated. An abundance of examples - in fact a whole chapter - completes this competent presentation of the subject. This Ergebnisbericht will soon become an indispensible tool for graduate students and researchers in this field.

Mass Equidistribution of Hecke Eigenforms on the Hilbert Modular Varieties Apr 18 2022 Abstract: In this thesis we study the analogue of Arithmetic Quantum Unique Ergodicity conjecture on the Hilbert modular variety. Let F be a totally real number field with ring of integers [O], and let [gamma] = SL(2, [O]) be the Hilbert modular group. Given the orthonormal basis of Hecke eigenforms in S2k([gamma]), the space of cusp forms of weight (2k, 2k, ⋯, 2k), one can associate a probability measure d[mu]k on the Hilbert modular variety [gamma]\[H]n. We prove that d[mu]k tends to the invariant measure on [gamma]\[H]n weakly as k [approaches infinity]. This shows that the analogue of Arithmetic Quantum Unique Ergodicity conjecture is true on the average on Hilbert modular variety. Our result generalizes Luo's result [Lu] for the case F = [Q].

Arithmetic Models for Hilbert-Blumenthal Modular Varieties Feb 02 2021

Number Theory Dec 15 2021 This volume is dedicated to Harvey Cohn, Distinguished Professor Emeritus of Mathematics at City College (CUNY). Harvey was one of the organizers of the New York Number Theory Seminar, and was deeply involved in all aspects of the Seminar from its first meeting in January, 1982, until his retirement in December, 1995. We wish him good health and continued hapiness and success in mathematics. The papers in this volume are revised and expanded versions of lectures delivered in the New York Number Theory Seminar. The Seminar meets weekly at the Graduate School and University Center of the City University of New York (CUNY). In addition, some of the papers in this book were presented at a conference on Combinatorial Number Theory that the New York Number Theory Seminar organized at Lehman College (CUNY). Here is a short description of the papers in this volume. The paper of R. T. Bumby focuses on "elementary" fast algorithms in sums of two and four squares. The actual talk had been accompanied by dazzling computer demonstrations. The detailed review of H. Cohn describes the construction of modular equations as the basis of studies of modular forms in the one-dimensional and Hilbert cases.

Moduli of Abelian Varieties Jun 28 2020 Abelian varieties and their moduli are a topic of increasing importance in today`s mathematics, applications ranging from algebraic geometry and number theory to mathematical physics. This collection of 17 refereed articles originates from the third "Texel Conference" held in 1999. Leading experts discuss and study the structure of the moduli spaces of abelian varieties and related spaces, giving an excellent view of the state of the art in this field.

Signature Defects of Cusps of Hilbert Modular Varieties and Values of L-series at S Sep 23 2022

Lectures on Hilbert Modular Surfaces Nov 13 2021

p-Adic Automorphic Forms on Shimura Varieties Aug 11 2021 In the early years of the 1980s, while I was visiting the Institute for Ad vanced Study (lAS) at Princeton as a postdoctoral member, I got a fascinating view, studying congruence modulo a prime among elliptic modular forms, that an automorphic L-function of a given algebraic group G should have a canon ical p-adic counterpart of several variables. I immediately decided to find out the reason behind this phenomenon and to develop the theory of ordinary p-adic automorphic forms, allocating 10 to 15 years from that point, putting off the intended arithmetic study of Shimura varieties via L-functions and Eisenstein series (for which I visited lAS). Although it took more than 15 years, we now know (at least conjecturally) the exact number of variables for a given G, and it has been shown that this is a universal phenomenon valid for holomorphic automorphic forms on Shimura varieties and also for more general (nonholomorphic) cohomological automorphic forms on automorphic manifolds (in a markedly different way). When I was asked to give a series of lectures in the Automorphic Semester in the year 2000 at the Emile Borel Center (Centre Emile Borel) at the Poincare Institute in Paris, I chose to give an exposition of the theory of p-adic (ordinary) families of such automorphic forms p-adic analytically de pending on their weights, and this book is the outgrowth of the lectures given there.

Hilbert Modular Forms Jan 16 2022 We study Hilbert modular forms in characteristic p and over p-adic rings. In the characteristic p theory we describe the kernel and image of the q-expansion map and prove the existence of filtration for Hilbert modular forms; we define operators U, V and Θ_χ and study the variation of the filtration under these operators. Our methods are geometric - comparing holomorphic Hilbert modular forms with rational functions on a moduli scheme with level-p structure, whose poles are supported on the non-ordinary locus.In the p-adic theory we study congruences between Hilbert modular forms. This applies to the study of congruences between special values of zeta functions of totally real fields. It also allows us to define p-adic Hilbert modular forms 'a la Serre' as p-adic

uniform limit of classical modular forms, and compare them with p-adic modular forms 'a la Katz' that are regular functions on a certain formal moduli scheme. We show that the two notions agree for cusp forms and for a suitable class of weights containing all the classical ones. We extend the operators V and Θ_χ to the p-adic setting.

A Mod P Jacquet-Langlands Relation and Serre Filtration Via the Geometry of Hilbert Modular Varieties Oct 13 2021 "We consider Hilbert modular varieties in characteristic p with Iwahori level at p and construct a geometric Jacquet-Langlands relation showing that the irreducible components are isomorphic to products of projective bundles over quaternionic Shimura varieties of level prime to p. We use this to establish a relation between mod p Hilbert and quaternionic modular forms that reflects the representation theory of GL_2 in characteristic p and generalizes a result of Serre for classical modular forms. Finally we study the fibres of the degeneracy map to level prime to p and prove a cohomological vanishing result that is used to associate Galois representations to mod p Hilbert modular forms." -- back cover.

Non-Archimedean L-Functions Sep 11 2021 1) p n=1 The set of arguments s for which ((s) is defined can be extended to all s E C,s :f:. 1, and we may regard C as the group of all continuous quasicharacters C = Hom(R~, c>

Diophantine Geometry May 27 2020 This is an introduction to diophantine geometry at the advanced graduate level. The book contains a proof of the Mordell conjecture which will make it quite attractive to graduate students and professional mathematicians. In each part of the book, the reader will find numerous exercises.

Intersections of Hirzebruch–Zagier Divisors and CM Cycles Apr 06 2021 This monograph treats one case of a series of conjectures by S. Kudla, whose goal is to show that Fourier of Eisenstein series encode information about the Arakelov intersection theory of special cycles on Shimura varieties of orthogonal and unitary type. Here, the Eisenstein series is a Hilbert modular form of weight one over a real quadratic field, the Shimura variety is a classical Hilbert modular surface, and the special cycles are complex multiplication points and the Hirzebruch-Zagier divisors. By developing new techniques in deformation theory, the authors successfully compute the Arakelov intersection multiplicities of these divisors, and show that they agree with the Fourier coefficients of derivatives of Eisenstein series.

Abelian Varieties Apr 26 2020 The series is aimed specifically at publishing peer reviewed reviews and contributions presented at workshops and conferences. Each volume is associated with a particular conference, symposium or workshop. These events cover various topics within pure and applied mathematics and provide up-to-date coverage of new developments, methods and applications.

Noncommutative Geometry and Number Theory Dec 03 2020 In recent years, number theory and arithmetic geometry have been enriched by new techniques from noncommutative geometry, operator algebras, dynamical systems, and K-Theory. This volume collects and presents up-to-date research topics in arithmetic and noncommutative geometry and ideas from physics that point to possible new connections between the fields of number theory, algebraic geometry and noncommutative geometry. The articles collected in this volume present new noncommutative geometry perspectives on classical topics of number theory and arithmetic such as modular forms, class field theory, the theory of reductive p-adic groups, Shimura varieties, the local L-factors of arithmetic varieties. They also show how arithmetic appears naturally in noncommutative geometry and in physics, in the residues of Feynman graphs, in the properties of noncommutative tori, and in the quantum Hall effect.

The 1-2-3 of Modular Forms Jun 08 2021 This book grew out of three series of lectures given at the summer school on "Modular Forms and their Applications" at the Sophus Lie Conference Center in Nordfjordeid in June 2004. The first series treats the classical one-variable theory of elliptic modular forms. The second series presents the theory of Hilbert modular forms in two variables and Hilbert modular surfaces. The third series gives an introduction to Siegel modular forms and discusses a conjecture by Harder. It also contains Harder's original manuscript with the conjecture. Each part treats a number of beautiful applications.

WIN -- Women in Numbers Jul 30 2020 This is a collection of papers on number theory which evolved out of the workshop WIN-Women In Numbers, held November 2-7, 2008. It includes articles showcasing outcomes from collaborative research initiated during the workshop as well as survey papers aimed at introducing graduate students and recent PhDs to important research topics in number theory.

Lectures on Hilbert Modular Varieties and Modular Forms Apr 30 2023 This book is devoted to certain aspects of the theory of p-adic Hilbert modular forms and moduli spaces of abelian varieties with real multiplication. The theory of p-adic modular forms is presented first in the elliptic case, introducing the reader to key ideas of N. M. Katz and J.-P. Serre. It is re-interpreted from a geometric point of view, which is developed to present the rudiments of a similar theory for Hilbert modular forms. The theory of moduli spaces of abelianvarieties with real multiplication is presented first very explicitly over the complex numbers. Aspects of the general theory are then exposed, in particular, local deformation theory of abelian varieties in positive characteristic. The arithmetic of p-adic Hilbert modular forms and the geometry ofmoduli spaces of abelian varieties are related. This relation is used to study q-expansions of Hilbert modular forms, on the one hand, and stratifications of moduli spaces on the other hand. The book is addressed to graduate students and non-experts. It attempts to provide the necessary background to all concepts exposed in it. It may serve as a textbook for an advanced graduate course.

Intersection Homology of Hilbert Modular Varieties and Quadratic Base Change Oct 25 2022

Hilbert Modular Forms and Iwasawa Theory Jul 10 2021 The 1995 work of Wiles and Taylor-Wiles opened up a whole new technique in algebraic number theory and, a decade on, the waves caused by this incredibly important work are still being felt. This book, authored by a leading researcher, describes the striking applications that have been found for this technique. In the book, the deformation theoretic techniques of Wiles-Taylor are first generalized to Hilbert modular forms (following Fujiwara's treatment), and some applications found by the author are then discussed. With many exercises and open questions given, this text is ideal for researchers and graduate students entering this research area.

The Arithmetic Genus of Hilbert Modular Threefolds Jun 20 2022

Hilbert Modular Surfaces Feb 23 2020

Elliptic Curves, Hilbert Modular Forms and Galois Deformations Feb 26 2023 The notes in this volume correspond to advanced courses held at the Centre de Recerca Matemàtica as part of the research program in Arithmetic Geometry in the 2009-2010 academic year. The notes by Laurent Berger provide an introduction to p-adic Galois representations and Fontaine rings, which are especially useful for describing many local deformation rings at p that arise naturally in Galois deformation theory. The notes by Gebhard Böckle offer a comprehensive course on Galois deformation theory, starting from the foundational results of Mazur and discussing in detail the theory of pseudo-representations and their deformations, local deformations at places l ? p and local deformations at p which are flat. In the last section,the results of Böckle and Kisin on presentations of global deformation rings over local ones are discussed. The notes by Mladen Dimitrov present the basics of the arithmetic theory of Hilbert modular forms and varieties, with an emphasis on the study of the images of the attached Galois representations, on modularity lifting theorems over totally real number fields, and on the cohomology of Hilbert modular varieties with integral coefficients. The notes by Lassina Dembélé and John Voight describe methods for performing explicit computations in spaces of Hilbert modular forms. These methods depend on the Jacquet-Langlands correspondence and on computations in spaces of quaternionic modular forms, both for the case of definite and indefinite quaternion algebras. Several examples are given, and applications to modularity of Galois representations are discussed. The notes by Tim Dokchitser describe the proof, obtained by the author in a joint project with Vladimir Dokchitser, of the parity conjecture for elliptic curves over number fields under the assumption of finiteness of the Tate-Shafarevich group. The statement of the Birch and Swinnerton-Dyer conjecture is included, as well as a detailed study of local and global root numbers of elliptic curves and their classification.

Abelian Varieties with Complex Multiplication and Modular Functions Mar 06 2021 Reciprocity laws of various kinds play a central role in number theory. In the easiest case, one obtains a transparent formulation by means of roots of unity, which are special values of exponential functions. A similar theory can be developed for special values of elliptic or elliptic modular functions, and is called complex multiplication of such functions. In 1900 Hilbert proposed the generalization of these as the twelfth of his famous problems. In this book, Goro Shimura provides the most comprehensive generalizations of this type by stating several reciprocity laws in terms of abelian varieties, theta functions, and modular functions of several variables, including Siegel modular functions. This subject is closely connected with the zeta function of an abelian variety, which is also covered as a main theme in the book. The third topic explored by Shimura is the various algebraic relations among the periods of abelian integrals. The investigation of such algebraicity is relatively new, but has attracted the interest of increasingly many researchers. Many of the topics discussed in this book have not been covered before. In particular, this is the first book in which the topics of various algebraic relations among the periods of abelian integrals, as well as the special values of theta and Siegel modular functions, are treated extensively.

Hilbert Modular Forms with Coefficients in Intersection Homology and Quadratic Base Change Dec 27 2022 In the 1970s Hirzebruch and Zagier produced elliptic modular forms with coefficients in the homology of a Hilbert modular surface. They then computed the Fourier coefficients of these forms in terms of period integrals and L-functions. In this book the authors take an alternate approach to these theorems and generalize them to the setting of Hilbert modular varieties of arbitrary dimension. The approach is conceptual and uses tools that were not available to Hirzebruch and Zagier, including intersection homology theory, properties of modular cycles, and base change. Automorphic vector bundles, Hecke operators and Fourier coefficients of modular forms are presented both in the classical and adèlic settings. The book should provide a foundation for approaching similar questions for other locally symmetric spaces.

Hilbert Modular Forms Jul 22 2022 Important results on the Hilbert modular group and Hilbert modular forms are introduced and described in this book. In recent times, this branch of number theory has been given more and more attention and thus the need for a comprehensive presentation of these results, previously scattered in research journal papers, has become obvious. The main aim of this book is to give a description of the singular cohomology and its Hodge decomposition including explicit formulae. The author has succeeded in giving proofs which are both elementary and complete. The book contains an introduction to Hilbert modular forms, reduction theory, the trace formula and Shimizu's formulae, the work of Matsushima and Shimura, analytic continuation of Eisenstein series, the cohomology and its Hodge decomposition. Basic facts about algebraic numbers, integration, alternating differential forms and Hodge theory are included in convenient appendices so that the book

can be used by students with a knowledge of complex analysis (one variable) and algebra.
Modular Curves and Abelian Varieties Aug 30 2020 This book presents lectures from a conference on "Modular Curves and Abelian Varieties" at the Centre de Recerca Matemtica (Bellaterra, Barcelona). The articles in this volume present the latest achievements in this extremely active field and will be of interest both to specialists and to students and researchers. Many contributions focus on generalizations of the Shimura-Taniyama conjecture to varieties such as elliptic Q-curves and Abelian varieties of GL_2-type. The book also includes several key articles in the subject that do not correspond to conference lectures.
Projective Varieties and Modular Forms Mar 18 2022
Periods of Hilbert Modular Surfaces May 20 2022
Win-- Women in Numbers Nov 01 2020 This volume is a collection of papers on number theory which evolved out of the workshop WIN - Women in Numbers, held November 2nd-7th, 2008, in Alberta, Canada. The book includes articles showcasing outcomes from collaborative research initiated during the workshop.
Algebraic Cycles and Motives: Volume 1 Dec 23 2019 This 2007 book is a self-contained account of the subject of algebraic cycles and motives.
Geometric Methods in Algebra and Number Theory Oct 01 2020 * Contains a selection of articles exploring geometric approaches to problems in algebra, algebraic geometry and number theory * The collection gives a representative sample of problems and most recent results in algebraic and arithmetic geometry * Text can serve as an intense introduction for graduate students and those wishing to pursue research in algebraic and arithmetic geometry