AUTOMORPHIC FORMS, REPRESENTATIONS, AND L-FUNCTIONS pdf

1: Galois Representations and Automorphic Forms | Mathematical Congress of the Americas

automorphic forms on, or automorphic representations of, reductive groups, the local and global problems pertaining to them, and of their relations with the L- functions of algebraic number theory and algebraic geometry, such as Artin L-.

Expression of subfields of cyclotomic field by radicals by Lagrange resolvents: Goldfeld] Updated version: For all r, the spectral decomposition of the associated Poincare series involves cuspidal data only from GL 2. Precise asymptotics for n-fold integrals of zonal spherical functions on SL 2,C , as simplest example of exponential decay. Debunking the demonstrably false claim that truncated Eisenstein series are eigenfunctions for invariant operators. This false claim continues to be needlessly invoked to give incorrect proofs of Maass-Selberg relations. I first heard this claim in , and was amazed to hear it recently Illustration of extension and uniqueness of distributions by simple homological ideas. Diaconu] and D. Evidence is given that the classical notion of higher moment of the Riemann zeta function is not correct. We propose a plausible candidate for a replacement. Spectral identities involving second moments of symmetric-square L-functions for SL Subconvexity in t-aspect for GL 2 over number fields as evidence for non-triviality of these identities. Heuristic concerning extraction of subconvex bounds. The method involves asymptotics for second integral moments, with a power saving in the error term, for a spectral family of twists by grossencharacters. Jussieu] Some standard i ntegrals for GL 2 , with derivations, discussion of normalizations. For example, determination of Whittaker functions. In principle, these computations exist in many places. This version has tripled in size by comparison to the old one. A recipe is given for producing spectral identities involving second moments. Appendices prove convergence in detail, evaluate integrals, etc. This version is slightly edited by comparison to the version on arXiv, too. The original below short version may succeed in isolating the really new points better. Appears in [Volume 8, Issue 02, April , pp , J. Combine very classical application of Poisson summation with Godement-Jacquet integral representation of L-functions to give a good estimate on poles of some very special partly cuspidal-data, partly degenerate-data Eisenstein series on GL n. Treating these as iterated residues of cuspidal-data Eisenstein series gives a significantly worse estimate on poles. This class of Eisenstein series is very special, but occurs in applications. We prove the Gelfand-Graev-PS theorem: Evaluation of archimedean zeta integrals arising in decomposition of holomorphic Siegel-type Eisenstein series restricted from larger to smaller unitary groups. Setting up Lie algebra action of sl 2 on Schwartz functions: The benefits of looking at the Lie algebra rather than Lie group action are compelling in this example. Amusing connection to spherical harmonics Invocation of subrepresentation theorem to study irreducible quotients in positive-definite case. Development of basic theory of buildings, Bruhat decompositions, aiming especially at simple discussion of Iwahori-Hecke algebra and Borel-Matsumoto theorem. Graphics meant to suggest proof techniques. Small novelty is the realization that one need not presume the combinatorial group theory of Coxeter groups. Computing natural intertwining operators among unramified principal series for SL 2,R. Meromorphic continuation in terms of the gamma function. Holomorphic discrete series summed with antiholomorphic detected. Meromorphically continued intertwining operators extend to smooth vectors. Proof of Siegel-Weil in the far-convergent range, by inequalities separating principal series Satake parameters of Eisenstein series and cuspforms. May be viewed as an updated version of an argument of Andrianov from Overheads for Bowling Green, KY, talk on Archimedean zeta integrals, and qualitative rationality arguments. Amplification of part of paper of N. Banach space representations of real reductive groups are of moderate growth. Further, the Frechet spaces of smooth vectors are of moderate growth. Jacquet the smooth induced module of cuspidal from compact-open is admissible and supercuspidal. Traces of the iterates of this kernel evaluate zeta 2k. This principle was used by Klingen c. It is very easy to give incorrect proofs of this. Proving for Sp n,R and U p,q the apparently apocryphal result that for sufficiently high lowest K-type rho the universal lowest-K-type g,K -module with lowest K-type rho is irreducible. The latter freeness property is essential in a treatment of Maass-Shimura operators. A one-page proof, not entangled with anything else. Basics, emphasizing discrete series, compact quotients, integration-theory methods. Very simple illustration of irreducibility of principal series, Jacquet modules,

uniqueness of Whittaker models, Mackey-Bruhat orbit decomposition, Gelfand-Graev involution method. The classical simplest possible example, obtaining the tensor product L-function for two holomorphic cuspforms for SL 2,Z , discussing also the Mellin-transform trick to see the meromorphic continuation of the relevant Eisenstein series. Borel-Matsumoto theorem and applications to irreducibility of unramified principal series and degenerate principal series representations of reductive p-adic groups. It seems to me now that the generic algebras business is needless, and amounts to taking the long way around. This will be written up in a different style Standard basic features of representation theory of p-adic reductive groups: Inner products of truncated Eisenstein series attached to spherical cuspidal-data on maximal proper parabolics in GL n , with standard corollaries about possible poles, square-integrability of residues. The absolutely simplest case: Standard corollaries about possible poles, square-integrability of residues, in this simple case. Essentially elementary argument using Poisson summation. Used in reduction of the non-maximal parabolic case to the maximal parabolic case in treatment of Eisenstein series, and in the proof for the Selberg-Bernstein argument for meromorphic continuation that a composition of weakly holomorphic morphisms of topological vectorspaces maps is again weakly holomorphic. Especially over local fields. Crossed product, cyclic algebra constructions. Local splitting almost everywhere. Classifies involutions over local fields. Further simplification of D. Remarks on spectral decompositions, intro to meromorphic continuation. Meromorphic continuation of cuspidal-data Eisenstein series for maximal proper parabolics in GL n. Revised setup and treatment of SL 2,Z. Complementary material for meromorphic continuation: Technical enhancement of the classical result for integral operators on cuspforms [Spectral Theory for SL 2,Z] AMS 66, from Texas conference Gives multiplicity-one sufficient conditions for factorization of global integrals into Euler product and period. Other basic stuff about affine heights and Minkowski reduction in modern setting. Compactness of arithmetic quotients of division algebras after Weil [Satake parameters versus principal series]

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2: Introduction to automorphic representations (DRAFT!)

SSSR 33 ; English trans. Steklov , , pp. Trombi, Birkhauser, Boston, ENS 10 , pp. Borel, Introduction aux groupes arithmetiques, Hermann, Paris, Pure Math 33 vol. Bourbaki, Groupes et Algebres de Lie, ch. France 84 , pp. France 89 , pp. Paris serie A, vol , pp. Burnside, Theory of groups of finite order, Cambridge Univ. Casselman, Introduction to the Theory of Admissible Representations of p-adic Reductive Groups, unpublished, dated ICM, Berkeley , pp. Freitag, Siegelsche Modulfunktionen, Grundl. Weiss, Marcel Dekker, New York, I Satake and Y. Morita, Birkhauser, Boston, Selberg, Oslo, , Academic Press, Nauk SSSR 70 , pp. Nauk SSSR , pp. Grothendieck, Products rensoriels topologiques et espaces nucleaires, Mem. Math 77 , pp. USA 40 , pp. Math 78 , pp. Igusa, Theta Functions, Grundl. Hamburg 6 , pp. USSR Sbornik 48 no. Math, Cambridge, , vol. Naturvid 43 , pp. Local Fields, Springer -Verlag, USA 49 , pp. Japan 31 , pp. Taniyama, Complex multiplication of abelian varieties and its applications to number theory, Publ. Frohlich, Thompson Book Co. A , pp. Weil, Adeles and algebraic groups, Princeton, ; reprinted Birkhauser, Boston, Weil, Integration dans les groupes topologiques et ses applications, Actualites Sci. ENS IV 13 , pp. The contents of this page have not been reviewed or approved by the University of Minnesota.

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3: Automorphic form - Wikipedia

The indulgent download automorphic forms representations and l functions of the aircraft allows the common host of Belarus, as the concept Unified by the Belarusian links at the Battle of Grunwald, and of the Red Army when they destroyed processing Nazi Germany during World War II.

Proceedings of symposia in pure mathematics; v. This book may not be reproduced in any form without permission of the publishers. Automorphic forms and representations Decomposition of representations into tensor products. A supplement to the preceding paper. Interpretation modulaire, et techniques de construction de modeles canoniques. Algebraicity of some products of values of the F function.. Recall that if H is a closed subgroup of finite index in G there is a transfer homomorphism t: Let F be a local or global field and F a separable algebraic closure of F. The continuity of rp just means that WE is open in WF for each E, and its having dense image means that rp induces a bijection of homogeneous spaces: The last ingredient of a Weil group is, for each E, an isomorphism of topological groups rE: In order to constitute a Weil group these ingredients must satisfy four conditions: W1 For each E, the composed map is the reciprocity law homomorphism of class field theory. This concludes our definition of Weil group. For each n E Z, let 1. E, the property W3 above implies, via an abstract cohomological theorem combine the corollary of p. Moreover, the canonical classes are interrelated by 1. Thus, implicit in the existence of Weil groups is all the cohomology of class field theory. F, where they are equal by 1. Thus, a Weil group exists for every F; to what extent is it unique? Let WF and w;.. SUCh that the diagramS and are commutative. Hence the projective limit proj limE I E is not empty. It turns out cf. We discuss now the special features of the four cases: F local nonarchimedean, F a global function field, F local archimedean, and F a global number field. In the first two of these, GF is a completion of Wp; in the last two it is a quotient of Wp. Here the picture is as in 1. Wp is the "unit circle" of elements u E P with! This is the only case in which there is, at present, no simple description of Wp, but merely the artificial construction by cocycles described in 1. This construction is due to Weil in [Wl], where he emphasizes the importance of the problem of finding a more natural construction, and proves the following facts. In each case the kernel WJ. Here Inn a denotes the inner automorphism defined by a. The isomorphism in 1. Since rp is injective, i. Suppose now F is global. Let v be a place of F and F " the completion of F at v. Fv be a separable algebraic closure of F resp. Fv and let WF resp. There exists a continuous homomorphism Ov: If F is a function field, then Ov is unique. The proof of this is analogous to the proof of 1. Let G be a topological group. By a representation of G we shall mean, in this section, a continuous homomorphism p: By a quasi-character of G we mean a continuous homomorphism X: If p, V is any representation of G, then det p is a quasi-character which we may sometimes denote also by det V. We let M G denote the set of isomorphism classes of representations of G, and R G the group of virtual represent;ttions. It follows that if a is an essentially inner automorphism of WF in the sense of 1. The independence from 0. For example, we will denote by w. On the other hand, since q;: We will call the representations in this subset "of Galois type". With these identifications, a character X of GF is identified with the character X of C F to which X corresponds by the reciprocity law homomorphism.

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4: Automorphic L-function - Wikipedia

[joint with Adrian Diaconu] And-yet-once-more-edited, enhanced/enlarged version of earlier preprint of the same name (below): integral moments for GL(2) automorphic L-functions over number fields, by integral representations. This version has tripled in size by comparison to the old one.

The Casimir operator condition says that some Laplacians [citation needed] have F as eigenfunction; this ensures that F has excellent analytic properties, but whether it is actually a complex-analytic function depends on the particular case. The values of j may be complex numbers, or in fact complex square matrices, corresponding to the possibility of vector-valued automorphic forms. The cocycle condition imposed on the factor of automorphy is something that can be routinely checked, when j is derived from a Jacobian matrix , by means of the chain rule. History[edit] Before this very general setting was proposed around , there had already been substantial developments of automorphic forms other than modular forms. The Hilbert modular forms also called Hilbert-Blumenthal forms were proposed not long after that, though a full theory was long in coming. The Siegel modular forms , for which G is a symplectic group , arose naturally from considering moduli spaces and theta functions. The post-war interest in several complex variables made it natural to pursue the idea of automorphic form in the cases where the forms are indeed complex-analytic. Much work was done, in particular by Ilya Piatetski-Shapiro , in the years around , in creating such a theory. The theory of the Selberg trace formula , as applied by others, showed the considerable depth of the theory. Robert Langlands showed how in generality, many particular cases being known the Riemann-Roch theorem could be applied to the calculation of dimensions of automorphic forms; this is a kind of post hoc check on the validity of the notion. From the point of view of number theory, the cusp forms had been recognised, since Srinivasa Ramanujan , as the heart of the matter. Automorphic representations[edit] The subsequent notion of an "automorphic representation" has proved of great technical value when dealing with G an algebraic group , treated as an adelic algebraic group. It does not completely include the automorphic form idea introduced above, in that the adelic approach is a way of dealing with the whole family of congruence subgroups at once. Inside an L2 space for a quotient of the adelic form of G, an automorphic representation is a representation that is an infinite tensor product of representations of p-adic groups , with specific enveloping algebra representations for the infinite prime s. One way to express the shift in emphasis is that the Hecke operators are here in effect put on the same level as the Casimir operators; which is natural from the point of view of functional analysis [citation needed], though not so obviously for the number theory. It is this concept that is basic to the formulation of the Langlands philosophy. He named them Fuchsian functions, after the mathematician Lazarus Fuchs , because Fuchs was known for being a good teacher and had researched on differential equations and the theory of functions. Automorphic functions then generalize both trigonometric and elliptic functions. For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series ; I had only to write out the results, which took but a few hours.

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5: Vignettes on automorphic and modular forms, representations, L-functions, and number theory

Automorphic forms, Galois representations and L-functions, and the interplay among them, have been at the heart of numerous major advances in number theory over the last few decades, from their relevance to long-standing problems such as Fermat's Last Theorem and the Birch and Swinnerton-Dyer Conjecture to their role in the evolution of new.

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6: bibliography for automorphic and modular forms, L-functions, representations, and number theory

2 Automorphic representations and L-functions for GL The L-function of an automorphic form 45 The local L-functions and their functional equations

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Automorphic Forms and Representations. This book, published by Cambridge University Press, is now www.enganchecubano.com final proofs were corrected on 9/16/ Here is the official catalog description from Cambridge.

8: Automorphic forms, representations, and L-functions, Part 2 - [PDF Document]

of the more peculiar features of the theory of L-functions (and of automorphic forms) which from the series representation: it follows immediately from the Euler.

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