

CONTEMPORARY MATHEMATICS

86

Representation Theory
and Number Theory
in Connection with
the Local Langlands
Conjecture



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86

Representation Theory and Number Theory in Connection with the Local Langlands Conjecture

Proceedings of a Conference held
December 8–14, 1985

with support from Stiftung Volkswagenwerk,
Bayerisches Staatsministerium für Unterricht und Kultus,
and Gesellschaft der Freunde der Universität Augsburg

J. Ritter
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1980 *Mathematics Subject Classification* (1985 Revision). Primary 11S37, 11S40, 11S45, 20G25, 22E50.

Library of Congress Cataloging-in-Publication Data

Representation theory and number theory in connection with the local langlands conjecture: proceedings of a conference held December 8–14, 1985/with support from Stiftung Volkswagenwerk, Bayerisches Staatsministerium für Unterricht und Kultus, and Gesellschaft der Freunde der Universität/J. Ritter, editor.

p. cm.—(Contemporary mathematics, ISSN 0271-4132; v. 86)

Papers from the Conference on Representation Theory and Number Theory in Connection with the Local Langlands Conjecture, held at the University of Augsburg, Augsburg, West Germany.

Bibliography: p.

ISBN 0-8218-5093-8 (alk. paper)

1. Algebraic number theory—Congresses. 2. Representations of groups—Congresses. I. Ritter, J. (Jürgen), 1943–. II. Conference on Representation Theory and Number Theory in Connection with the Local Langlands Conjecture (1985: University of Augsburg). III. Series.

QA241.R44 1989

88-39030

512'.74—dc 19

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PREFACE

The present volume reflects the contents of the talks given at the conference "Representation Theory and Number Theory in connection with the Local Langlands Conjecture" held at the University of Augsburg in December 1985^{*)}. The Langlands programme sums up those parts of mathematical research that belong to the representation theory of reductive groups and to class field theory, the two topics being tied up by the vision that, roughly speaking, the irreducible representations of the general linear group may well serve as parameters for the description of all number fields. In the local situation, i.e. when the base field is a given p -adic field K and where we think of the extension theory of K being determined by the irreducible representations of the absolute Galois group G_K of K , great progress has been achieved in establishing an arithmetic correspondence between the objects in question, that is, the supercuspidal representations of $GL(n,K)$ or, equally well, the irreducible representations of the multiplicative group of a division algebra D that is central and of index n over K , and, on the other hand, those irreducible representations of G_K whose degrees divide n :

- Howe-Corwin, Koch-Zink, and, with respect to the root numbers, Bushnell-Fröhlich, have settled the so-called tame case, that is, when $p \nmid n$.
- Henniart, Kutzko, and Moy have solved the case $n = p$.
- Deligne and Kazhdan have proved a matching theorem providing a one-to-one correspondence between the representation theory of $GL(n,K)$ and D^\times .
- Henniart, on the occasion of this conference, gave the proof of the numerical Langlands conjecture.

Since no book or paper was available presenting the different methods used so far nor even collecting the results at our disposal, there seemed to be a need for a conference reflecting what has been done in this area. The programme of the conference was divided into two parts:

- (i) the representation theory of local division algebras and local Galois groups; the Langlands conjecture in the tame case
- (ii) new results - the case $n = p$; the matching theorem; principal orders; tame Deligne representations; classification of representations of $GL(n)$; the numerical Langlands conjecture.

*) The meeting was run by G. Michler (Essen) and the editor, it was made possible by the generous support of Stiftung Volkswagenwerk, of Bayerisches Staatsministerium für Unterricht und Kultus, and of Gesellschaft der Freunde der Universität Augsburg; it took place in the Schwabenakademie Irsee near Augsburg.

The collection of talks in this volume gives a good account of what the state of affairs in the local Langlands programme is; we have only left out those talks which either were meant to merely provide concrete examples or the subject of which has by now appeared in the literature in detail, as for example the matching theorem in []. Some of the conjectures stated in the talks have meanwhile been proved - we give the reference where the proof is going to be published.

J. Ritter, Augsburg, April 1987

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ISBN 0-8218-5093-8



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