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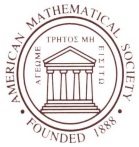
Volume 55.2

Motives

Summer Research Conference on Motives
July 20–August 2, 1991
University of Washington
Seattle, Washington

Uwe Jannsen
Steven Kleiman
Jean-Pierre Serre
Editors



American Mathematical Society

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(*Continued in the back of this publication*)

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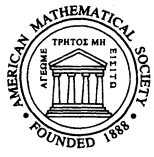

American Mathematical Society
Providence, Rhode Island

PROCEEDINGS OF THE SUMMER RESEARCH CONFERENCE
ON MOTIVES

HELD AT THE UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON
JULY 20–AUGUST 2, 1991

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Contents

PART 2

Preface

The American Mathematical Society, the Institute of Mathematical Statistics, and the Society for Industrial and Applied Mathematics held a joint summer research conference at the University of Washington at Seattle from July 20 to August 2, 1991 on the topic of motives. The conference was organized by Alexander Beilinson (MIT and Moscow), Pierre Deligne (IAS), Uwe Jannsen (Köln), Steven Kleiman (MIT, co-chair), Robert MacPherson (MIT), Jean-Pierre Serre (Collège de France), and Kari Vilonen (Brandeis, co-chair).

The theory of motives was introduced in the middle 1960s by Alexander Grothendieck to explain the analogies among the various cohomology theories for algebraic varieties, to play the role of the missing rational cohomology, and to provide a blueprint for proving Weil's conjectures about the zeta function of a variety over a finite field. Remarkably, over the last ten years or so, researchers in various areas—Hodge theory, algebraic K-theory, polylogarithms, automorphic forms, L-functions, ℓ-adic representations, trigonometric sums, and algebraic cycles—have discovered that an enlarged (and in part conjectural) theory of "mixed" motives indicates and explains phenomena appearing in each area. Thus the theory holds the potential of enriching each area and of unifying them all.

The Seattle conference was the first symposium ever held on motives. It presented a unique opportunity to bring together researchers and students in these diverse areas to exchange ideas and discover common themes. Everyone who applied was invited to attend, and about 140 people from all over the world registered and participated. About a third of the participants were students.

The scientific program ran eleven days. Each day, there were four one-hour lectures; the number was limited to encourage informal discussion. The first lectures introduced and surveyed the entire field; subsequent lectures elaborated on the individual areas. On the last day there was a single one-hour main lecture, followed by six half-hour subsidiary lectures. The lecturers

were assigned topics, and were asked to paint panoramic views from their vantage points. A copy of the program is appended.

These volumes contain the proceedings of the conference. They include the revised texts of nearly all the lectures and a number of related works, forty-seven papers in all. There are general introductions, specialized surveys, and research papers. Each paper was refereed and is in final form.

The University of Washington provided a convenient, comfortable, and attractive site, which was conducive to the success of the conference. The AMS did a superb job of administration, freeing the organizing committee to concentrate on the scientific program. In particular, Carole Kohanski, the AMS Conference Coordinator, went far beyond the call of duty. On behalf of the entire organizing committee and all of the participants, the editors wish to express their gratitude to everyone who contributed to the success of the conference and to the production of these proceedings.

Uwe Jannsen
Steven Kleiman
Jean-Pierre Serre

Program

First Week

SUNDAY (Classical motives):

1. Historical introduction (Serre)
2. Standard conjectures (Kleiman)
3. Examples (Scholl)
4. An overview (Deligne)

MONDAY (Cohomology theories):

1. Étale cohomology (Katz)
2. Hodge theory (Steenbrink)
3. Crystalline cohomology (Illusie)
4. The Tate conjectures (Tate)

TUESDAY (Tannakian categories):

1. Tannakian categories and the motivic Galois group (Breen)
2. Motives for absolute Hodge cycles (Panchishkin)
3. CM-motives and the Taniyama group (Schappacher)
4. Motives over finite fields (Milne)

WEDNESDAY (L-functions):

1. Motivic Galois groups (Serre)
2. L-functions (Deninger)
3. The conjectures of Deligne and of Birch/Swinnerton-Dyer (Gross)
4. K-theoretic background (Grayson)

THURSDAY (Beilinson conjectures):

1. Beilinson conjectures I (Soulé)
2. Beilinson conjectures II (Nekovář)
3. Beilinson conjectures III: Reformulation in terms of mixed motives (Scholl)
4. Mixed motives and motivic sheaves (Jannsen)

FRIDAY (Bloch-Kato conjectures, Beilinson-Lichtenbaum complexes):

1. Bloch-Kato conjectures I (Perrin-Riou)
2. Bloch-Kato conjectures II (Fontaine)
3. Beilinson-Lichtenbaum complexes (Lichtenbaum)
4. Higher Chow groups (Bloch)

Second Week

SUNDAY (Mixed Tate motives):

1. Polylogarithms and the line minus three points (Hain)
2. Mixed Tate motives I (MacPherson)
3. Mixed Tate motives II: Zagier's conjecture (Goncharov)
4. Beilinson's work on the Zagier conjecture (Deligne)

MONDAY (Automorphic forms I):

1. The local Langlands conjecture (Kudla)
2. Pure motives and automorphic forms (Ramakrishnan)
3. Shimura varieties and motives (Milne)
4. L-functions of Shimura varieties (Rogawski)

TUESDAY (Automorphic forms II):

1. Hodge-de Rham structures and periods (M. Harris)
2. Mixed motives coming from Shimura varieties (Harder)
3. Galois representations congruent to those arising from Shimura varieties (Tilouine)
4. mod-p Galois representations and Serre's conjectures (Ribet)

WEDNESDAY (p-adic theory, function fields):

1. p-adic L-functions (Coates)
2. Iwasawa theory for motives (Greenberg)
3. p-adic motives (Schneider)
4. Function fields (Goss)

THURSDAY (Miscellaneous topics):

1. Exponential sums (Katz)
2. ℓ-adic representations associated to abelian varieties (Serre)
3. p-adic properties of absolute Hodge cycles (Wintenberger)
4. The motive of an abelian variety (Künnemann)
5. Parshin-Beilinson adèles for schemes (Huber)
6. Hodge modules, questions (M. Saito)
7. F_q-points of a variety and a Hodge-theoretic analogue (Esnault)

Recent Titles in This Series

(*Continued from the front of this publication*)

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8 **Albert Leon Whiteman, editor,** Theory of numbers (California Institute of Technology, Pasadena, November 1963

(See the AMS catalog for earlier titles)

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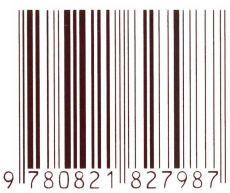

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