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Hochschild Cohomology in Algebra, Geometry, and Topology

Organised by
Luchezar L. Avramov, Lincoln
Ragnar-Olaf Buchweitz, Toronto
Wendy Lowen, Antwerpen

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Abstract. In 1945 Gerhard Hochschild published *On the cohomology groups of an associative algebra* in the *Annals of Mathematics* and thereby created what is now called Hochschild theory. In 1963, Murray Gerstenhaber proved that the Hochschild cohomology of any associative algebra carries a super-Poisson algebra structure, comprised of a graded commutative cup product and an odd super Lie algebra structure that acts through graded derivations with respect to the product. Subsequently, a number of higher structures have been discovered, and a vast body of research concerning and/or using Hochschild theory has developed in many different fields in mathematics and physics.

Mathematics Subject Classification (2010): 16E, 13D, 14F, 55N, 83E30.

Introduction by the Organisers

This meeting had 27 participants from 10 countries (Argentina[2], Belgium[3], Canada[2], China[3], France[4], Germany[1], Norway[3], Russia[2], UK[1], and the US[6]) and 20 lectures were presented during the five day period. The extended abstracts of these lectures are presented on the following pages in chronological order.

This workshop fostered exchange of knowledge and ideas between various research areas, developed existing collaborations, and identified new directions of research by bringing together leading researchers and young colleagues from Algebraic Geometry (in its classical and its noncommutative version), Singularity Theory, Representation Theory of Algebras, Commutative Algebra, and Algebraic

Topology. The choice of a coherent group of disciplines, rather than a broad coverage of Hochschild theory, allowed for effective communication between different groups of practitioners.

Survey lectures on Hochschild cohomology of algebraic varieties, the relationship between loop homology and Hochschild cohomology in algebraic topology, and on the Hochschild cohomology of block algebras of finite groups were complemented by presentations on higher order structures on Hochschild cohomology such as existence of a Batalin–Vilkovisky operator or the explicit form of the Gerstenhaber Lie bracket in special cases. Further, categorical interpretations of various aspects of Hochschild theory were presented, and variations of Hochschild cohomology such as Koszul or Poisson cohomology were studied.

Numerous discussions among the participants, in particular among participants belonging to different mathematical communities, have contributed to the workshop in an essential way. As always, such workshop at MFO provided an ideal atmosphere for fruitful interaction and exchange of ideas. It is a pleasure to thank the administration and the staff of the Oberwolfach Institute for their efficient support and hospitality.

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