Abstract. The notion of support is a fundamental concept which provides a geometric approach for studying various algebraic structures. The prototype for this has been Quillen's description of the algebraic variety corresponding to the cohomology ring of a finite group, based on which Carlson introduced support varieties for modular representations. This has made it possible to apply methods of algebraic geometry to obtain representation theoretic information. Their work has inspired the development of analogous theories in various contexts, notably modules over commutative complete intersection rings, and over cocommutative Hopf algebras. The aim of this workshop has been to bring together experts from these fields and to stimulate interaction and exchange of ideas.

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Introduction by the Organisers

Let $K$ be a field of characteristic $p$ and $G$ a finite group. Quillen gave a description of the cohomology ring $H^*(G, K)$ modulo nilpotent elements as an inverse limit of cohomology rings of elementary abelian $p$-subgroups of $G$. This has led to the work of Benson, Carlson and others on the theory of varieties for $KG$-modules, and in general to deep structural information about modular representations of finite groups. Inspired by this success similar theories have been developed in other contexts. This includes $p$-Lie algebras, finite group schemes, and complete intersection rings in commutative algebra. More recently, support varieties have been constructed for Lie superalgebras. Going in a different direction, Snashall and Solberg initiated the construction of support varieties for modules of more general finite dimensional algebras, via the Hochschild cohomology, with appropriate
finite generation properties. Furthermore, generalising Jon Carlson’s construction for group algebras in several contexts, rank varieties have been introduced and shown to be isomorphic to support varieties. Some work towards a unified approach has been done, in particular by Balmer, and then by Buan, Krause and Solberg. This workshop has brought together experts working on the various aspects of support in different areas, to review what is known, and to clarify unified concepts. The focus was on the following three aspects: the theory, computations and applications. Introductory surveys were given by Petter Bergh (support via central ring actions), Ivo Dell’Ambrogio (tensor triangular geometry) and Dan Nakano (applications of support varieties). Then there were 9 talks presenting recent developments in the subject. Three additional evening sessions completed the picture: Ralf Kroemer (one of the organisers of a parallel workshop on the history of category theory) presented a portrait of Samuel Eilenberg, who contributed towards the homological foundations for today’s work on support varieties, Dan Nakano explained techniques for calculating support varieties, and a third evening was used for a problem session. The mix of participants from different areas and the relatively small size of the workshop 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.