Abstract. The workshop gave an overview of current research in the representation theory and analysis of reductive Lie groups and its relation to spherical varieties and Hecke algebras. The participants and the speakers represented an international blend of senior researchers and young scientists at the start of their career. Some particular topics covered in the 30 talks related to structure theory of spherical varieties, $p$-adic symmetric spaces, symmetry breaking operators, automorphic forms, and local Langlands correspondence.

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Introduction by the Organisers

The international conference Representation Theory and Analysis of Reductive Groups: Spherical Spaces and Hecke Algebras, organized by Bernhard Krötz (Paderborn), Eric M. Opdam (Amsterdam), Henrik Schlichtkrull (Copenhagen), and Peter Trapa (Salt Lake City) was held January 19th – January 25th, 2014. This conference brought together scientists from the separate, yet intimately related, fields of harmonic analysis of real Lie groups and representation theory of Hecke algebras. The meeting was attended by 50 participants, and a total of 30 lectures of length between 1/2 hour and 50 minutes were given. The participants and the speakers represented an international blend of senior researchers and young scientists at the start of their career. The meeting belongs to a long tradition of workshops around the theme of Harmonische Analysis und Darstellungstheorie.
topologischer Gruppen, but for most of the participants this was their first visit to Oberwolfach (and for some, even to Europe).

The workshop opened with a lecture of Friedrich Knop giving an overview of the structure of spherical spaces, first in the case of complex reductive group actions and then in the much more recently established real case. The theory in the real case is foundational for approaching a host of geometric and analytic questions with very far reaching applications. For example, the space of unramified Langlands parameters for a reductive p-adic group in a great number of cases (and, optimistically, all cases) arises from the structure theory of certain spherical spaces of Langlands parameters for real reductive groups. The theory covered in Knop’s lectures should, therefore, provide insight into the intricate relationship between the representation theory of real and p-adic groups, something envisioned in rough form in the original work of Harish-Chandra and Langlands on the subject.

The talk of Friedrich Knop was followed by an equally impressive talk by Patrick Delorme covering a new and interesting approach to the harmonic analysis on p-adic reductive symmetric spaces. Previous results by Sakellaridis and Venkatesh were put in a geometric perspective which opens up a wide possibility for generalization.

All the selected speakers gave interesting talks of high quality in which recent research results were presented, and they were followed by vivid discussion among the participants.

Also the talks by the young participants were noteworthy for their presentation of new methods in the field. For example it was interesting to see in the talk by Benjamin Harris how microlocal techniques can provide some very basic information on representation of real reductive Lie groups.

The relationship between representation theory of real and p-adic groups was again on display in the talk of Kei Yuen Chan, one of the workshop’s graduate student participants. His talk sought to transport ideas for the construction of discrete series representations of real reductive groups to the p-adic case via the theory of affine Hecke algebras. Chan’s talk sparked a suggestion from a senior workshop participant, namely to use deformations in the affine Hecke algebra setting (a tool unavailable in the real case), which Chan is now implementing to great effect. The workshop provided an ideal setting to encourage this kind of interaction between junior and senior participants.

In the talk of Allen Moy it was shown that the sum of the depth zero Bernstein projectors for p-adic SL(2) is supported on the set of topologically unipotent elements (joint work with Howe). This beautiful result raises interesting questions for higher depth and more general groups. Moy’s talk was dedicated to the memory of Paul Sally, who passed away a few weeks before the meeting. The early representation theory for p-adic SL(2;R) was to a large extend developed by Paul, whose passion for the topic is legendary.
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