Abstract. The talks covered advances in algebraic $K$-theory and topological cyclic homology, geometric group theory, low dimensional topology relying on a mixture of combinatorial and analytic methods, classification of high-dimensional manifolds and more. Special emphasis was given to a recent breakthrough on the question of triangulability of high-dimensional manifolds.


Introduction by the Organisers

The workshop Topologie (2018) was organized by a team consisting of Mark Behrens (Notre Dame), Ruth Charney (Brandeis), Peter Teichner (Bonn) and Michael Weiss (Münster). It was unfortunate that Ruth Charney and Mark Behrens could not attend this time, but the list of invitees was managed by all four organizers, and as the meeting progressed the program for each day was decided on jointly by all four (communicating via skype and email).

The preferred calendar month for this meeting used to be September, but we moved it to July (beginning with the 2016 meeting) to make it more attractive for international participants. The list of participants at this workshop indicates that this goal was achieved. It should also be noted that many of our invitees had to decide between Oberwolfach and a topology meeting running concurrently at the Newton Institute, Cambridge. There is no indication that this lowered the standards, but it may have led to a greater-than-usual emphasis on low-dimensional topology at this meeting.
About 50 mathematicians participated in the workshop. Out of 18-19 hours total speaking time, approximately 5 hours were devoted to algebraic $K$- and $L$-theory including applications to high-dimensional manifolds, 2 hours to other homotopy theory (some of which related to manifolds), 3-4 hours to geometric group theory and related aspects of 3-manifold theory, 3 hours to overviews and applications of Seiberg-Witten theory and Heegaard-Floer homology (tools in low-dimensional topology), and 2 more hours on other aspects low dimensional topology. In addition to that, three 1-hour talks on *Triangulation and homology bordism* were delivered by Ciprian Manolescu.

We had invited Manolescu to report on his groundbreaking work (~2012) on the question of triangulability of high-dimensional manifolds. His first talk was accessible to all and turned on the history of the triangulation problem as well as a known reduction (going back to the late 1970s) to questions on the bordism group $\Theta^3_3$ of 3-dimensional homology spheres. The remaining two talks were an exposition of Heegaard-Floer homology, Seiberg-Witten theory and their uses in the investigation of $\Theta^3_3$. Some talks by other speakers (e.g. Stipsicz and Hom) provided additional sketches of the Heegaard-Floer and Seiberg-Witten theories for non-experts and incentives to learn more about them.

For the Wednesday morning program we selected 7 junior speakers to give talks of 20 minutes each. This was a slight deviation from the “gong shows” of previous meetings. Unresolved issues of fairness notwithstanding, these talks seemed to reach the audience very well and no doubt some of them could have been expanded into very successful one-hour talks. We mention the talks by Markus Land on $K$-theory, by Peter Feller on algebro-geometric aspects of knot theory and by Arunima Ray on some hitherto neglected issues in 4-dimensional topological surgery as examples.

To conclude the introduction we give a very brief chronological overview of the regular talks. More details can be found in the abstracts which form the body of this report.

Oscar Randal-Williams talked about a novel investigation of $E_\infty$-algebras in terms of cell decompositions and related filtrations, specifically without imposing group completeness. Applications to algebraic $K$-theory were given. Akhil Mathew presented new results on the algebraic $K$-theory and topological cyclic homology of henselian pairs, extending an older result by Dundas and McCarthy formulated for nilpotent ideals. Cornelia Drutu talked about median geometries and properties of groups acting on such geometries. Andras Stipsicz gave a very accessible talk on knot concordance invariants based on knot Floer homology. Birgit Richter reported on a new “strictly commutative” model for the cochain algebra of a space; she explained this terminology and how it does not contradict the existence of the Steenrod operations (traditionally known as obstructions to commutativity). Wolfgang Lück talked about new results related to the Cannon conjecture, which concerns torsion free hyperbolic groups with boundary homeomorphic to a
Workshop: Topologie

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Oscar Randal-Williams (joint with Søren Galatius, Alexander Kupers)
  On Rognes’ connectivity conjecture ............................. 1863

Akhil Mathew (joint with Dustin Clausen and Matthew Morrow)
  $p$-adic algebraic K-theory and topological cyclic homology .... 1864

Cornelia Drutu (joint with Indira Chatterji)
  Median geometry for lattices in semisimple Lie groups .......... 1867

Ciprian Manolescu
  Homology cobordism and triangulations .......................... 1867

András I. Stipsicz
  Concordance invariants from knot Floer homology .......... 1870

Birgit Richter (joint with Steffen Sagave)
  A strictly commutative model for the cochain algebra of a space .... 1872

Wolfgang Lück (joint with Steve Ferry and Shmuel Weinberger)
  The Stable Cannon Conjecture ................................. 1874

Markus Land (joint with Georg Tamme)
  On K-theory of pullbacks ....................................... 1876

Daniel Kasprowski (joint with Mark Powell and Peter Teichner)
  Four-manifolds up to connected sum with complex projective planes ... 1879

Peter Feller (joint with Immanuel van Santen)
  Uniqueness of embeddings of the affine line into affine spaces ...... 1881

Lukas Brantner (joint with Akhil Mathew)
  Formal Moduli Problems and Partition Lie Algebras ............ 1883

Grigori Avramidi
  Thickening CW complexes to manifolds ........................ 1886

Pedro Boavida de Brito (joint with Pascal Lambrechts, Paul Arnaud Songhafouo and Dan Pryor)
  Smooth embeddings of a triangulated manifold ................... 1887

Arunima Ray (joint with Mark Powell and Peter Teichner)
  The 4-dimensional sphere embedding theorem .................. 1888

Jean-François Lafont
  Closed aspherical manifolds .................................. 1890
Mona Merling (joint with Cary Malkiewich)

\textit{G-manifolds and algebraic $K$-theory} .......................... 1893

Francesco Lin (joint with Michael Lipnowski)

\textit{The Seiberg-Witten equations and the length spectrum of hyperbolic three-manifolds} .......................... 1896

Jennifer Hom (joint with Kristen Hendricks and Tye Lidman)

\textit{Heegaard Floer and homology cobordism} .......................... 1898

Alessandro Sisto (joint with Peter Feller, Pierre Mathieu and Samuel Taylor)

\textit{What does a generic 3-manifold look like?} .......................... 1898

Matthew Hedden

\textit{An overview of knot theory and algebraic curves} .......................... 1901

Søren Galatius (joint with Tony Feng and Akshay Venkatesh)

\textit{Galois action on the symplectic $K$-theory of $\mathbb{Z}$} .......................... 1905